THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LVI. No. 1421.] LONDON, AUGUST 5, 1890. [42ND YEAR. Price 6d.

WOLSTON'S Paste and Ready Mixed for Use.

Guaranteed Free from Adulteration. **TORBAY PAINTS.**

FOR GASHOLDERS, &c., &c.

The Original "Torbay Paints" As supplied during many years to the LONDON GASLIGHT & COKE COMPANY.

Illustrated Price List Post Free.

TORBAY & DART PAINT Co., Ld.,
23, Gt. George St., Westminster, S.W.
DARTMOUTH, & BRIXHAM (TORBAY).

— ESTABLISHED 1830. —
PARKER & LESTER,
Manufacturers & Contractors.

THE ONLY MAKERS OF
PATENT ANTIMONY PAINT,
Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores for Gas and Water Works.

WORKS:
ORMSIDE STREET, OLD KENT ROAD, LONDON.

Ashmore, Benson, Pease, & Co., Ld.,
STOCKTON-ON-TEES,
Manufacturing Gas Engineers.
See Advertisement, p. 236.

CEMENT
EARLE'S
BEST
Portland Cement
MANUFACTURED BY
GEO. & THOS. EARLE,
HULL.

Office: 7, PIER STREET.
Works: WILMINGTON.
STOREAGE CAPACITY 10,000 Tons.

ESTABLISHED 1811—OVER THREE QUARTERS OF A CENTURY.
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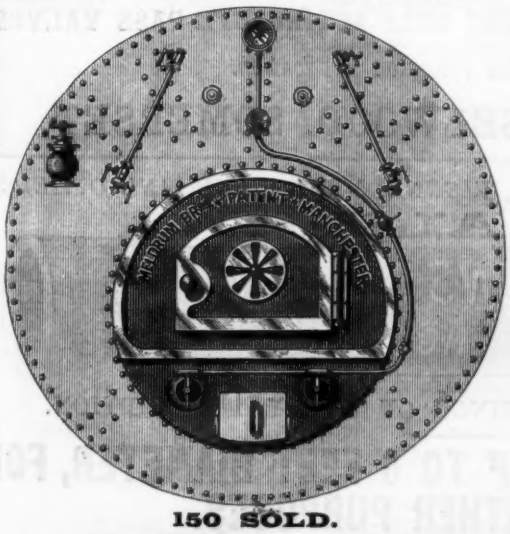
NORTON'S PATENT
"ABYSSINIAN" & ARTESIAN TUBE WELLS,
FOR TOWN WATER-WORKS AND OTHER SUPPLIES.

The following Town Water-Works Supplies have been obtained by this System, viz. :—Abbott's Langley, Aldershot, Alnwick, Cirencester, Hertford, Lechlade, St. Albans, Shrewsbury, Skegness, Southampton, Stony Stratford, Swansea, Wallingford, Watford, West Worthing, Wimborne, &c.

LE GRAND & SUTCLIFF,
HYDRAULIC ENGINEERS, 100, BUNHILL ROW, LONDON, E.C.

SELF-CONTAINED DUST FUEL FURNACE.



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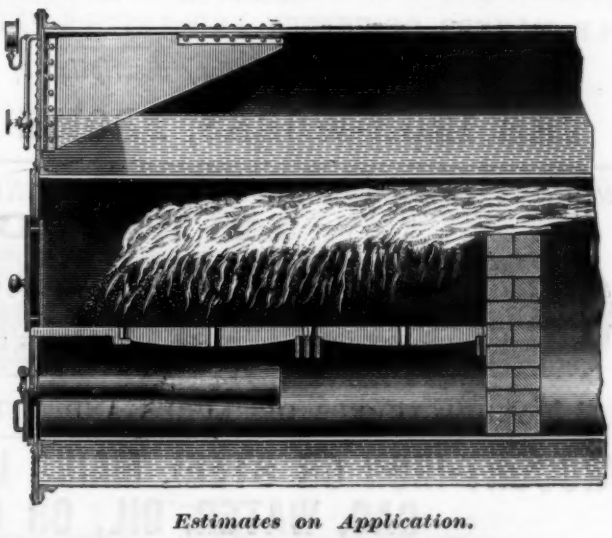


Estimates on Application.

MELDRUM BROS.,
26, HALF STREET, CATHEDRAL YARD, MANCHESTER.

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER & BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM

(ESTABLISHED 1765).

MANUFACTURER OF TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST IRON TANKS FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, and all kinds of GAS APPARATUS,

Wrought-Iron Roofs, Bridges, Girders, &c.,

Steam, Hot Water, and Range Boilers, Tanks, Cisterns, Boats, and all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES SUPPLIED ON APPLICATION.

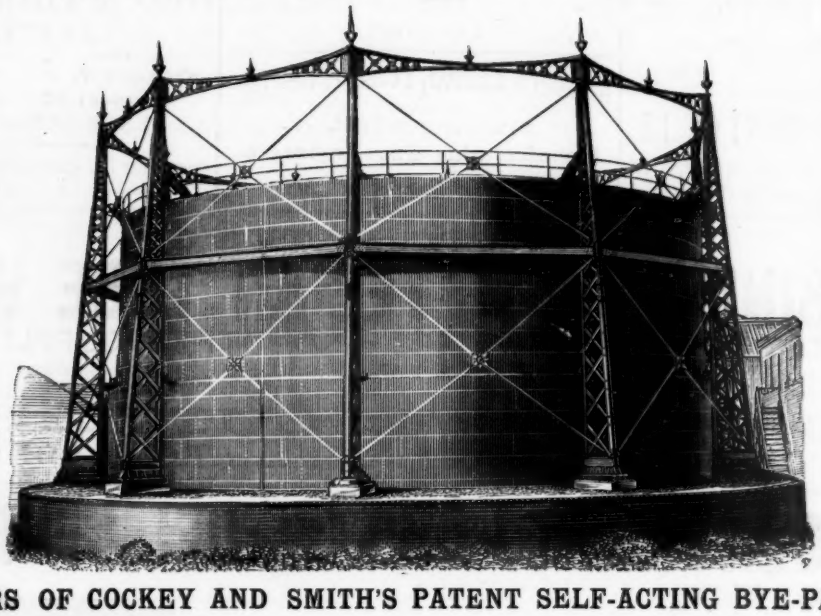
TELEGRAPHIC ADDRESS: "COCKEY'S FROME."

EDWARD COCKEY & SONS, Ld.,

ESTABLISHED OVER HALF A CENTURY.

Gas Engineers, Ironfounders, & Contractors,

Manufacturers of *GASHOLDERS and TANKS, BOILERS and ENGINES, ROOFS, EXHAUSTERS, BREEZE SCREENS, CHARGING and COKE BARROWS.*



Manufacturers of *PATENT WASHERS, PATENT VALVES for PURIFIERS, &c., GOVERNORS, LAMP COLUMNS, Weighbridges, COKE BREAKERS.*

SOLE MAKERS OF COCKEY AND SMITH'S PATENT SELF-ACTING BYE-PASS VALVES.

Estimates for any description of Gas Plant on application.

THE IRON-WORKS, FROME SELWOOD, SOMERSET.

HIGHEST AWARDS—LONDON, PARIS, COLOGNE, VIENNA, MELBOURNE, AND OTHERS.

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MANUFACTURERS OF TUBES AND FITTINGS OF EVERY DESCRIPTION.

WROUGHT-IRON OR STEEL MAINS UP TO 6 FEET DIAMETER, FOR GAS, WATER, OIL, OR OTHER PURPOSES.

SCREWING TACKLE, BOILER MOUNTINGS, VALVES, COCKS, ETC.

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THOMAS PIGGOTT & CO.,

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MANUFACTURERS OF

GAS APPARATUS

OF EVERY DESCRIPTION

INCLUDING

GASHOLDERS

and Tanks,

Retorts, Purifiers,

Valves, Scrubbers,

Condensers,

ETC., ETC.

All of the most approved Designs.

BOILERS, ENGINES, PUMPS,

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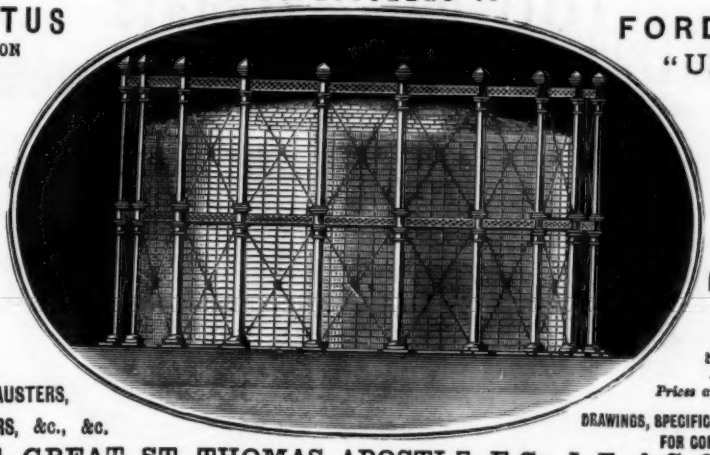
METERS, GAUGES, GOVERNORS, &c., &c.



FORD'S PATENT

"UNIVERSAL"

SCRUBBER-

WASHER.

Numbers at work, giving excellent results.

No Motive Power Required.

ALSO OF

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RETORT MOUTHPIECES

AND

SELF-SEALING LIDS.

NO LUTING REQUIRED.

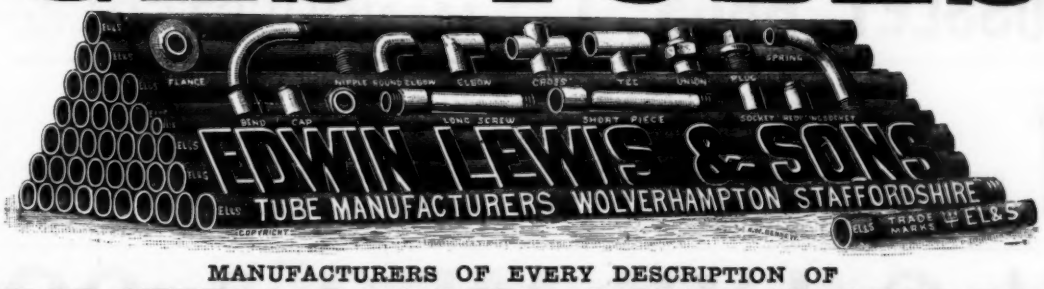
Prices and Particulars on application.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES PREPARED FOR COMPLETE GAS PLANT.

London Offices: 14, GREAT ST. THOMAS APOSTLE, E.C.—J. E. & S. SPENCER, Agents.

ESTABLISHED 1825.

GAS TUBES



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IRON OR STEEL LAP-WELDED OR BUTT-WELDED TUBES

FOR ANY PURPOSE.

NEWTON, CHAMBERS, & CO., LIMITED,

THORNCLIFFE IRON-WORKS, near SHEFFIELD,

MANUFACTURERS OF

SLIDE VALVES,

WITH RACK & PINION,

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Internal or External

SCREWS, of all Sizes.

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AND

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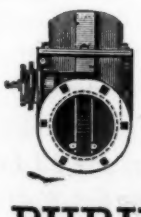


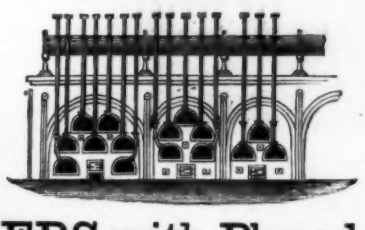
CAST-IRON RETORTS,

RETORT-BED FITTINGS,

And Retort-House Appliances

of every description.

Iron Roofs, Columns, Girders, Floor Plates and Tools, &c.



WROUGHT AND CAST IRON

CONDENSERS,

SCRUBBERS, & WASHERS,

TAR AND LIQUOR PUMPS, &c.

PATENT

CENTRE VALVES

for working Purifiers.

Also Bye-Pass & Stop Valves.

PURIFIERS with Planed Joints,

HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS and SPECIALS,

WOOD GRIDS.

CAST AND WROUGHT IRON TANKS AND CISTERNS.

DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

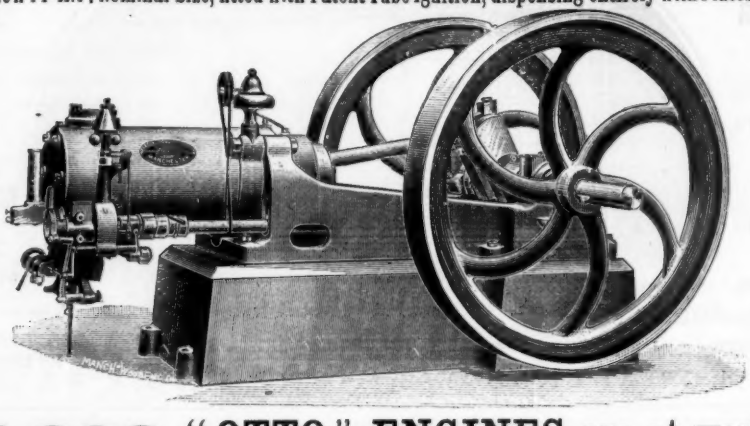
Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

CROSSLEY'S "OTTO" GAS-ENGINE.

100 Prize Medals.

New 14-H.P. Nominal Size, fitted with Patent Tube Ignition, dispensing entirely with Plates.



MADE in SIZES *2-Man to 100-HP.*

GAS-ENGINES COMBINED WITH **PUMPS** FOR TOWNS SUPPLY, SEWAGE, &c., &c

GAS-ENGINES COMBINED WITH **AIR COMPRESSORS** FOR THE SHONE SEWAGE SYSTEM, LUCIGEN LIGHT, &c.

MADE in SIZES *2-Man to 100-HP.*

VERTICAL AND HORIZONTAL TYPES.

ENGINES *COMBINED* WITH HOISTS, PUMPS, DYNAMOS, &c. &c.

Largely used for EXHAUSTING, PUMPING, COKE CRUSHING, ELECTRIC LIGHTING, &c., &c.

Over 31,000 "OTTO" ENGINES are at work.

CROSSLEY BROS., LTD., OPENSHAW, MANCHESTER,

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MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.

GLAZED BRICKS AND PORCELAIN BATHS.

W. C. HOLMES & CO.,

CONTRACTING GAS ENGINEERS.

SPECIALITIES.

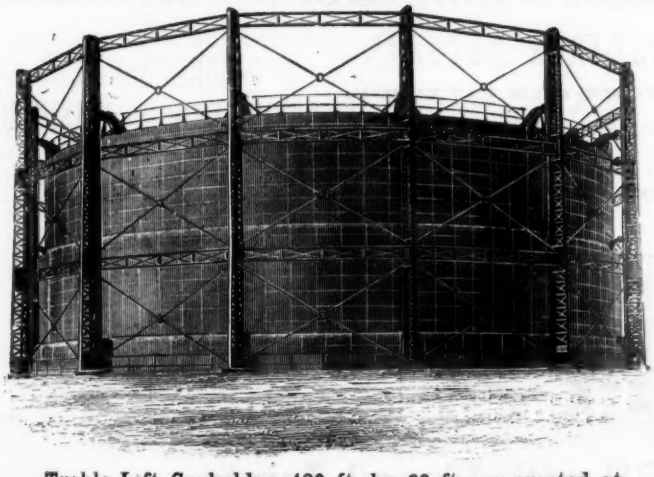
Patent Regenerative Retort-Settings.

Patent Rotary Scrubber-Washer.

Patent Reciprocating Exhauster.

Patent Regulator.

Patent Anti-Dip Pipes.



Treble-Lift Gasholder, 130 ft. by 66 ft., as erected at Burton-on-Trent, 1889.

WHITESTONE IRON-WORKS,

HUDDERSFIELD,

AND

80, CANNON STREET, LONDON, E.C.

SOLE MAKERS OF

DRAKE'S PATENT

GAS PLANT

Specially adapted for Country Places, and for mixing with Coal Gas to increase Illuminating Power.

Condensers, Scrubbers, Purifiers, and all Fittings for Gas-Works.

IMPROVED CHEMICAL PLANT.

Telegrams: "Holmes Huddersfield." "Ignitor London."

Illustrated Catalogues on application.

JOHN HALL & CO.,

STOURBRIDGE,

MANUFACTURERS OF FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

RETORTS CAREFULLY PACKED FOR SHIPMENT.

A STOCK OF DIFFERENT SHAPES ON HAND.

GAS AND WATER PIPES

AND

CASTINGS OF EVERY DESCRIPTION.

MANUFACTURED BY THE

CLAY CROSS COMPANY,

CHESTERFIELD.

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SULPHATE OF AMMONIA.

By Her Majesty's Royal Letters Patent.

DR. FELDMANN'S APPARATUS

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICES APPLY TO THE

Sole Agents and Manufacturers,

GODDARD, MASSEY, & WARNER,

ENGINEERS,

NOTTINGHAM.

The Apparatus has been supplied to the following Firms—

BURT, BOULTON, & HAYWOOD, SILVERTOWN, and ELING.
CHANCE BROTHERS, OLDBURY (4 Apparatus).
RUNCORN SOAP & ALKALI CO., Limited, RUNCORN.
NETHAM CHEMICAL CO., Limited, BRISTOL.
ANIMAL CHARCOAL CO., Limited, SHADWELL.
WM. BUTLER & CO., BRISTOL.
KEMPSON & CO., Pye Bridge.

And to the following Gas Companies and Corporations—

ILKESTON.	BURY.	CHORLEY.
WIDNES	BRIGHOUSE.	WHITEHAVEN.
HALIFAX.	MARKET HARBRO'.	CHESTER.
ALTRINCHAM.	PRESCOT.	SOUTH SHIELDS.
DENTON.	SOWERBY BRIDGE.	LEEK.
ST. ALBANS.	LEICESTER.	IPSWICH.
DUKINFIELD.	DARWEN.	BOURNEMOUTH.
NORTHWICH.	NELSON.	SALFORD.
HUDDERSFIELD.	ORMSKIRK.	LUTON.
		HAMPTON COURT.

CUTLER'S PATENT

Guide-Framing for Gasholders.

STRONG. SAFE. CHEAP.

Copy of Letter received from TUNBRIDGE WELLS GAS COMPANY.

Gas Company's Offices, Tunbridge Wells,

April 1, 1890.

Dear Sirs,

I am instructed by the Directors to express their great satisfaction with the Gasholder you constructed for this Company last year, and which is provided with your PATENT SYSTEM OF GUIDE-FRAMING.

The Engineer has reported very favourably, not only of the work itself, which is excellent but of the merits of the PATENT GUIDE-FRAMING, which he thinks fully justifies all you claim for it.

The Directors also appreciate the liberal way in which you interpreted your obligation as to the strength of the material to be used, which, now that the work is completed, is found to be no doubt stronger than it need have been; but inasmuch as our Gasholder was the first to which the System had been applied, they think you did wisely in not reducing the material to the limits which are no doubt perfectly possible in such a Guide-Framing.

I am, Dear Sirs, yours truly,

(Signed) JOHN READ, Secretary.

Messrs S. CUTLER & SONS,
Great George Street Chambers,
16, Great George St., Westminster, S.W.

JOSEPH CLIFF & SONS,

INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.,

WORTLEY, LEEDS.

LONDON Offices & Depôts:
Baltic Wharf, Waterloo Bridge.

WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.

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MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

ESTABLISHED MORE THAN A QUARTER OF A CENTURY

WORKS HUNSLET, LEEDS

LONDON OFFICE: 60, QUEEN VICTORIA STREET E.C.

CLAYTON SON & CO. LTD.

MAKE A SPECIALTY OF GASHOLDERS

AND MAKERS OF GAS PLANT OF EVERY DESCRIPTION.

REG? TELEGRAPHIC ADDRESS: "GAS LEEDS"

R. & J. DEMPSTER,

ENGINEERS, IRONFOUNDERS,

AND CONTRACTORS,

Gas-Plant Works, Newton Heath, MANCHESTER.

TOWER SCRUBBERS WITH PLANED JOINTS OF HANDSOME DESIGN.

Messrs. R. & J. D. wish to specially direct the attention of Gas Managers to the larger quantity of Ammoniacal Liquor or Sulphate **made** by their Scrubbers than by any of the numerous Rotary and other Machines now upon the market. From 28 lbs. to 34 lbs. of Sulphate are produced (per ton of coal carbonized) by their Scrubbers; whereas 20 lbs. to 22 lbs. is as much as can be got by the Machines. Gas Managers with low yields of Sulphate should not rest satisfied (because Ammonia does not show on test papers) until they are getting all the Ammonia it is possible to make. It should be remembered that each gallon of liquor, or 1 lb. of Sulphate, is worth about 1d.; thus, when every ton of coal carbonized is multiplied by 6d., 8d., 10d., or 1s., from increased yield of Sulphate on the quantity of coals used per annum, a very large extra profit is made. Irrespective of the profit made from the increased yield of Ammonia, these Scrubbers utilize the Ammonia as a purifying agent, and very considerably reduce the amount of work to be done in the purifiers.

London Offices:

181, GRESHAM HOUSE, OLD BROAD ST., E.C.

KIRKHAM, HULETT, & CHANDLERS' LTD.,

NEW PATENT "STANDARD" WASHER.

EXTRACTS THE WHOLE of the AMMONIA

Also a Large Proportion of H_2S and CO_2 from Gas.

MINIMUM WEIGHT IN MOTION.
MINIMUM DRIVING POWER.
MINIMUM BACK PRESSURE.
MINIMUM WEAR AND TEAR.
WITH MAXIMUM RESULTS.

Testimonial from the Chief Engineer of The Gaslight & Coke Co.

The Gaslight and Coke Company, Horseferry Road, Westminster, S.W.,
Nov. 25, 1889.

Messrs. KIRKHAM, HULETT, AND CHANDLER, LIMITED,

GENTLEMEN,—In reply to your enquiry respecting the result of putting "Wooden Bundles" into some of the Washer-Scrubbers at our Beckton Station, I beg to say they have answered admirably for the few months they have been in; and I think them a decided success.—I am, yours truly,

(Signed) G. C. TREWBY.

NOTE.—The first Washer referred to in the above was fitted with improved "Bundles" in May, 1888; *and these have proved so satisfactory that The Gaslight and Coke Company have had several other "Standard" Washers fitted in the same manner, and have recently given an order for machines for* 6,000,000 *cubic feet per day.*

396 "Standard" Washer-Scrubbers supplied (and in course of construction), equal to a daily capacity of 359,560,000 cubic feet of Gas.

FOR LIST OF ORDERS, SEE PREVIOUS ADVERTISEMENTS.

PALACE CHAMBERS, BRIDGE STREET,
WESTMINSTER, S.W.

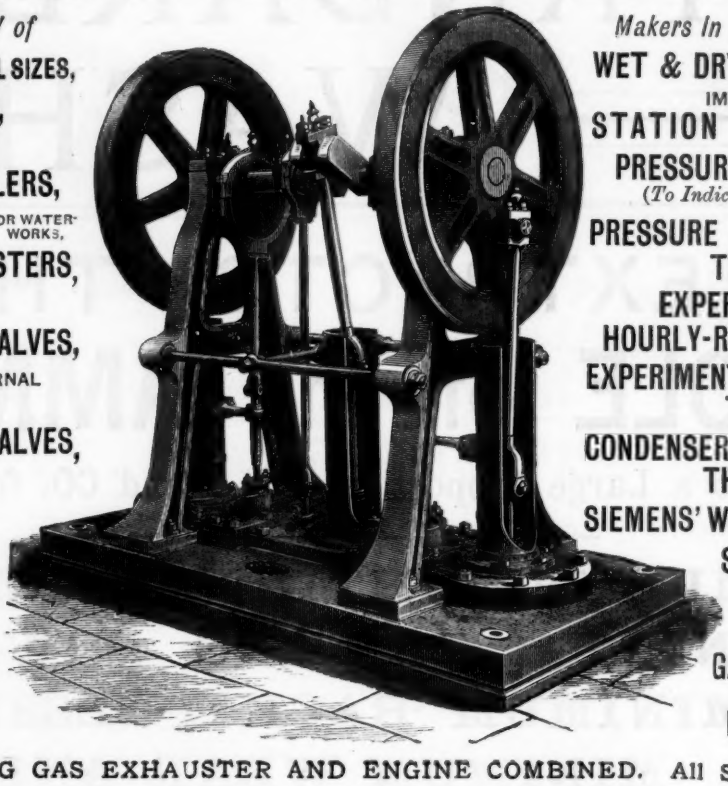
R. LAIDLAW & SON,

GAS AND WATER ENGINEERS.

Manufacturers of **GAS APPARATUS** of every Description.

Makers in GLASGOW of

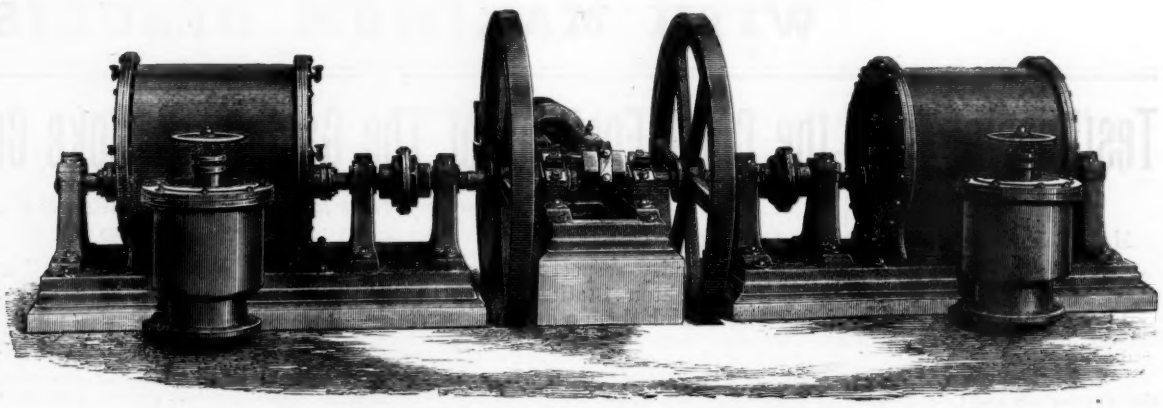
CAST-IRON PIPES, ALL SIZES,
LAMP PILLARS,
STEAM-ENGINES AND BOILERS,
PUMPING ENGINES FOR WATER-WORKS,
BEALE'S GAS EXHAUSTERS,
DOUBLE-FACED SLUICE VALVES,
INTERNAL AND EXTERNAL RACK OR SCREW SLIDE VALVES,
CAST-IRON COLUMNS,
BEAMS, GIRDERS, AND WATER-TANKS,
WROUGHT-IRON TUBES, FITTINGS, &c.



Makers in EDINBURGH of

WET & DRY GAS-METERS,
IMPROVED STATION GOVERNORS,
PRESSURE REGISTERS *(To Indicate New Time)*,
PRESSURE GAUGES,
TEST HOLDERS,
EXPERIMENTAL HOURLY-RATE METERS,
EXPERIMENTAL TEST METERS,
CONDENSER THERMOMETERS,
SIEMENS' WATER-METERS,
STREET LANTERNS,
And all Kinds of GAS APPARATUS AND FITTINGS, &c.

PUMPING GAS EXHAUSTER AND ENGINE COMBINED. All Sizes.



BEALE'S GAS EXHAUSTERS AND ENGINE COMBINED. All Sizes.

Prices, with full Particulars, will be given on application.

Two Gold Medals, One Silver Medal, One Bronze Medal, and Two Honourable Mentions,
INTERNATIONAL EXHIBITION, EDINBURGH, 1886.

ALLIANCE FOUNDRY, **GLASGOW.** | SIMON SQUARE WORKS, **EDINBURGH.** | 6, LITTLE BUSH LANE, **LONDON, E.C.**

TANGYES LIMITED,

CORNWALL WORKS, BIRMINGHAM.

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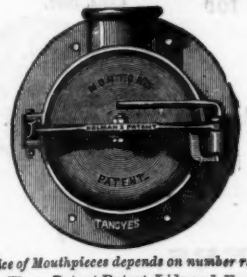
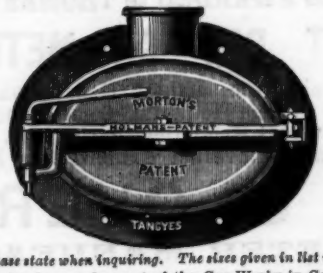
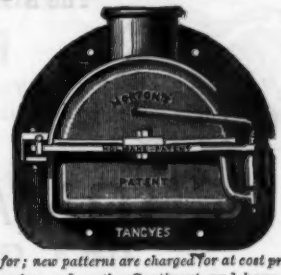
LONDON . . . . 35, QUEEN VICTORIA ST., E.C. | MANCHESTER . . . . . DEANSGATE
NEWCASTLE-ON-TYNE ST. NICHOLAS BUILDINGS | GLASGOW . . . . . ARGYLE STREET

Sole Makers of **MORTON'S** Patent Self-Sealing **RETORT-LIDS,**

With Anti-Friction CATCHES, and Self-Sustaining CROSS-BARS.







Price of Mouthpieces depends on number required, which please state when inquiring. The sizes given in list we have patterns for; new patterns are charged for at cost price.

These Patent Retort Lids and Fastenings are in extensive use in most of the Gas-Works in Great Britain, America, and on the Continent, and have almost entirely displaced the older method of sealing by a luting of lime or other material. The Lids are made in three forms, D, oval, and round (as shown above), in each of which we have a very extensive variety of patterns, from which Gas Engineers contemplating the adoption of these lids are recommended to make their selection, in order to avoid cost of pattern making, delays, &c., &c.

Mouthpieces with Circular Lids for Oval Retorts.

Pattern No.	Diam. Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	PRICE, Lid and Fittings without Mouthpiece.
13658	14 ins.	14 × 12 ins.	15 ins.	£0 19 0
4356	14 „	18½ „ 12 „	19½ „	0 19 0
6851	15 „	16 „ 14 „	13 „	1 0 0
3629	15 „	18½ „ 13½ „	14 „	1 0 0
3580	15 „	21 „ 15 „	15 „	1 0 0
6264	16 „	18½ „ 15½ „	15½ „	1 1 0
5210	16 „	20 „ 14 „	15 „	1 1 0
6263	16 „	24 „ 16 „	19½ „	1 1 0
5370	17 „	20 „ 14 „	14 „	1 3 0
6832	17 „	20 „ 14 „	17 „	1 3 0
6183	17 „	20 „ 15 „	15 „	1 3 0
4289	17 „	21 „ 15 „	14 „	1 3 0
5270	17 „	22 „ 14 „	14 „	1 3 0
3631	18 „	18 „ 14 „	20 „	1 5 0
3681	18 „	21 „ 14 „	13½ or 15 „	1 5 0
3554	18 „	21 „ 15 „	14½ „	1 5 0
7957	18 „	22 „ 16 „	14 „	1 5 0
8048*	19 „	25½ „ 15 „	18 „	1 8 6

Mouthpieces with Oval Lids for Oval Retorts.

Pattern No.	Dimensions of Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	PRICE, Lid and Fittings without Mouthpiece.
9800	18 × 14½ ins.	18 × 14½ ins.	15 ins.	£1 5 0
9205	20 „ 12 „	24 „ 14 „	10½ „	1 10 0
10000	20½ „ 14½ „	20½ „ 14½ „	15 „	1 10 0
9680	21 „ 15 „	21 „ 15 „	15 „	1 12 0
10056	21 „ 14½ „	21 „ 14½ „	15½ „	1 12 0
13218	21 „ 15 „	21 „ 15 „	17 „	1 12 0
10514	22½ „ 13½ „	22½ „ 13½ „	13½ „	1 13 0
13766	20 „ 17 „	20 „ 17 „	15½ „	1 15 0
13269	24 „ 15 „	24 „ 15 „	16 „	1 18 0

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Mouthpieces for Round Retorts.

Diam. .. .. ins.	14	15	16	17	18
Price, Lid and Fittings without Mouthpiece £	0 19 0	1 0 0	1 1 0	1 3 0	1 5 0

Mouthpieces with Circular Lids for D Retorts.

Pattern No.	Diam. Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	PRICE, Lid and Fittings without Mouthpiece.
5348	14 ins.	14 × 13 ins.	7 ins.	£0 19 0
3463	15 „	15 „ 13 „	14 „	1 0 0
6678	15 „	15 „ 14 „	12 „	1 0 0
3661	15½ „	15½ „ 13 „	12 „	1 1 0
13052	16 „	16 „ 13 „	18 „	1 1 0
5601	16 „	16 „ 14 „	15 „	1 1 0
6827	16 „	16 „ 14 „	17 „	1 1 0
4494	16 „	16 „ 14 „	14 „	1 1 0
3548	16 „	16 „ 15 „	12½ „	1 1 0
6677	16 „	16½ „ 13½ „	12½ „	1 1 0
9645	16 „	16½ „ 13½ „	13½ „	1 1 0
4434	16 „	17½ „ 14 „	14 „	1 1 0
6469	16 „	18 „ 14 „	15 „	1 1 0
9015	16 „	18 „ 14 „	16½ „	1 1 0
4327	16 „	18 „ 15 „	15½ „	1 1 0
8049*	16 „	18 „ 15 „	17½ „	1 1 0
6137	16 „	20½ „ 13½ „	13½ „	1 1 0
5918	17 „	18 „ 14 „	14 or 17 „	1 3 0
5053	17 „	19½ „ 12 „	14½ „	1 3 0
7548	17 „	20 „ 13 „	15 „	1 3 0
6468	17 „	20 „ 16 „	15½ „	1 3 0
4316B	17 „	21 „ 14 „	14 „	1 3 0
7975	17 „	21 „ 15 „	14½ „	1 3 0
13459	17 „	21½ „ 13½ „	15 „	1 3 0
12990	18 „	18 „ 15 „	15 or 19 „	1 5 0
7135	18 „	18½ „ 15 „	13 „	1 5 0
10221	18 „	18 „ 16 „	12½ „	1 5 0
4506	18 „	20 „ 13 „	19½ „	1 5 0
6470	18 „	20 „ 13 „	16 „	1 5 0
6818	18 „	20 „ 13½ „	17½ „	1 5 0
4083	18 „	20 „ 15 „	16 „	1 5 0
5306	18 „	20½ „ 14 „	13½ „	1 5 0
13295	18 „	20½ „ 14 „	19½ „	1 5 0
7356	18 „	20½ „ 13½ „	13 „	1 5 0
4569	18 „	21 „ 14 „	18 „	1 5 0
3628	18 „	21 „ 15 „	16 „	1 5 0
7640	18 „	22 „ 12½ „	13½ „	1 5 0
7971*	20 „	20 „ 15 „	18 „	1 11 0

*Patterns marked * have Sockets at back to connect to Retorts; all the others are flanged. Patterns marked B have curved bottoms.* 191

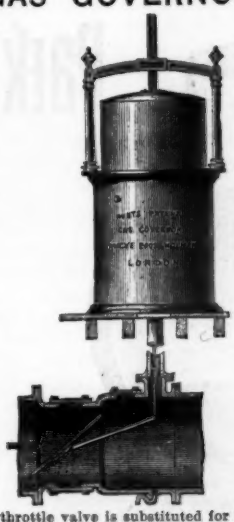
Mouthpieces with D Lids for D Retorts.

Pattern No.	Dimensions of Mouth.	Internal Dimensions of Retort.	Length of Mouthpiece.	PRICE, Lid and Fittings without Mouthpiece.
12292	15½ × 13 ins.	15½ × 13 ins.	12 ins.	£1 2 0
9967	16 „ 14 „	16 „ 14 „	15½ „	1 3 0
13574	16½ „ 13½ „	16½ „ 13½ „	19½ „	1 4 0
9899	18 „ 12 „	18 „ 12 „	14 „	1 4 0
12980	16 „ 16 „	16 „ 16 „	18 „	1 6 0
13900	18 „ 13½ „	18 „ 13 „	15 „	1 6 0
9912	18 „ 13½ „	18 „ 13½ „	17 „	1 6 0
9962	18 „ 13½ „	18 „ 13½ „	16 „	1 6 0
10982	18 „ 13½ „	18 „ 14 „	15 „	1 6 0
11098	18 „ 14 „	18 „ 14 „	12 „	1 6 0
9492	20 „ 13 „	20 „ 13 „	15 „	1 10 0
9208	20 „ 13 „	20 „ 13 „	19½ „	1 10 0
10251	20 „ 13 „	20 „ 13 „	15½ „	1 10 0
12964	20 „ 13 „	20 „ 13 „	18½ „	1 10 0
9909	20 „ 13½ „	20 „ 13½ „	17 „	1 10 0
12969	19½ „ 15½ „	19½ „ 15½ „	14 „	1 11 0
13781	20 „ 15 „ Front. / 21 „ 15 „ Back.	21 „ 15 „	15 „	1 11 0
7692	21 „ 15½ „	21 „ 15½ „	16 „	1 11 0
12978	20 „ 16 „	20 „ 16 „	17 „	1 11 0
13252	20 „ 16 „	20 „ 16 „	18 „	1 11 0
13220	21 „ 15 „	21 „ 15 „	17 „	1 11 0
8977	21½ „ 13½ „	21½ „ 13½ „	18½ „	1 11 0
8976	21½ „ 13½ „	21½ „ 13½ „	18½ „	1 12 0
10497	21½ „ 13½ „	21 „ 13½ „	18½ „	1 12 0
8037	21½ „ 13½ „	21½ „ 13½ „	18½ „	1 12 0
9908	21½ „ 13½ „	21½ „ 13½ „	15 „	1 12 0
10404	21½ „ 13½ „	22 „ 14 „	18½ „	1 12 0
12410	21½ „ 13½ „	22 „ 14 „	12 „	1 12 0
13822	21½ „ 13½ „	22 „ 14 „	15 „	1 12 0
10515	22½ „ 13½ „	22½ „ 13½ „	13½ „	1 12 0
7924	24 „ 14 „	24 „ 14 „	15½ „	1 13 0
13807	24 „ 15½ „	24 „ 15½ „	16 „	1 14 0
9015B	25 „ 14 „	25 „ 14 „	12½ „	1 14 0
10932	25 „ 14 „	24 „ 14 „	18½ „	1 15 0
12944B	22 „ 16 „	22 „ 16 „	16 „	1 15 0

Patterns marked B have curved bottoms. 192

HUNT'S PATENT EQUILIBRIUM DIRECT MAIN

GAS GOVERNOR.



In this Governor a throttle valve is substituted for the ordinary suspended cone; all external communication being avoided by placing the lever or radius arm inside the valve chamber upon the disc.

The disc is carried upon steel centres, upon which it is accurately balanced.

4 ins. .. £17 0	8 ins. .. £25 0	14 ins. .. £42 0	20 ins. .. £60 0
5 „ .. 20 0	10 „ .. 33 0	16 „ .. 46 0	24 „ .. 72 0
6 „ .. 22 10	12 „ .. 38 0	18 „ .. 50 0	30 „ .. 130 0

195

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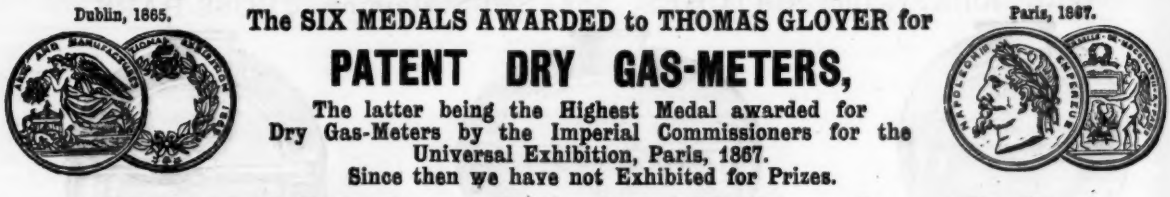
London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.



The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.
Since then we have not Exhibited for Prizes.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

And at 37, BLACKFRIARS STREET, MANCHESTER.

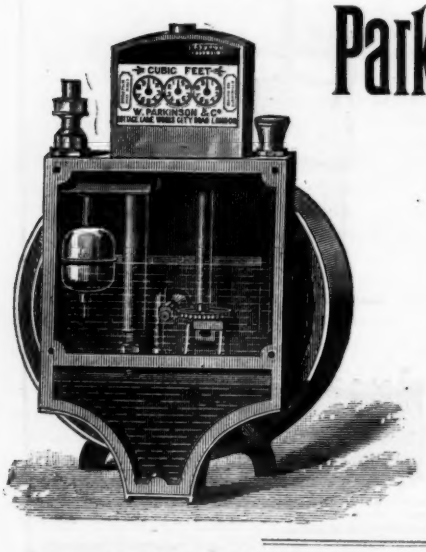
TELEGRAPHIC ADDRESSES: "GOTHIC LONDON," "GOTHIC MANCHESTER." TELEPHONE No. 6725.

1st—Are a remedy for all the defects of Wet Meters.
2nd—Are suitable for all climates, whether hot or cold.
3rd—Incur no loss of Gas by Evaporation.
4th—Cannot become fixed by Frost, however severe.
5th—Are the most accurate and unvarying measurers of Gas.
6th—Prevent jumping or unexpected extinction of the Lights.
7th—May be fixed either above or below the level of the Lights.
8th—Cannot be tampered with without visibly damaging the outer case.
9th—Will last much longer than Wet Meters.
10th—Will not cost more than one-half for repair that Wet or Water Meters do.
Are upheld for five years without charge.

W. PARKINSON & CO.

ESTABLISHED 1816.

MANUFACTURERS OF WET METERS.



Parkinson's Cast-Iron Case Meter.

Works with very little friction.

Will stand very high pressures.

Cannot possibly be shut off by sudden increase of pressure; the float being affected by outlet gas only.

Allows for loss of water by evaporation without materially affecting the registration or shutting off the gas.

Unexcelled for Simplicity of Construction, Excellence of Workmanship, and Accuracy of Registration.

COMPENSATING METERS,

In Tinned or Cast-Iron Cases.

COTTAGE LANE WORKS, CITY ROAD,
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MANCHESTER.
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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 5, 1890.

The Directors' Report and Statement of Accounts for the Past Half-Year's Working of The Gaslight and Coke Company.

THE Directors' report and the statement of accounts relating to the past half-year's working of The Gaslight and Coke Company will be found on another page. The general meeting is called for Friday, when the proceedings may be expected to be decidedly interesting. The report plunges without preface into the subject of the earnings for the half year, which are stated to show a profit balance of £362,983 as applicable to dividend. Seeing that six months ago the balance was £574,785, and a year ago it stood at £662,021, the attention of the proprietors may well be riveted on this serious falling off in the profit, which is probably thrown at their heads in this way in order to prepare them for the announcements of the rise in the price of gas by 3d. per 1000 cubic feet, and the reduction of the dividend by ¾ per cent., which follow. We have on previous occasions had to remark on the wonderful way in which these Chartered balances ebb and flow, and are nowise inclined to argue upon them in a general way. The report challenges inquiry this time, however, by setting forth with almost ostentatious circumstantiality the reasons why the Company's profit has fallen off. There are as many variations in these half-yearly reports as there are fluctuations in the appearance of the accounts. Sometimes, as at the corresponding epoch of 1889, the Directors are chatty to jubilation. The last report was also communicative. This time the barometer has fallen considerably; and the proprietors are told in few words, which are meant to be very much to the point, that they have to face an increased expenditure of £200,000 a year for labour and £300,000 a year for coals, or a substantial half-a-million sterling altogether, coming on the top of a stagnant business. As a matter of fact, the accounts under review show an actual decrease in the quantity of gas sold; the bulk accounted for being 9,145,716,000 cubic feet, as against 9,179,113,000 for the corresponding half of 1889. Certainly, these are matters for grave consideration, particularly the last. It is explained in the report by reference to the high temperature and the absence of dark and foggy weather which characterized the winter months of the half year. When the accounts of the other London Companies are published, it will be seen how much they have suffered in the same way.

Nothing can be said about the advanced cost of labour to the Company. As to the increased price of coal, the report makes some rather questionable remarks. It claims that the Company have "not suffered from the rise in the "price of coal to the extent which might have been appre-"hended; the beneficial terms of their expiring contracts "having enabled the Directors to negotiate those which "have just come into operation from an advantageous "position. By a re-arrangement of their existing con-"tracts, some of which had still several months to run at "low prices, the Directors were able to provide for the "whole of their present requirements on equitable and "favourable terms." It will be noticed with respect to this statement that, in the first place, the peculiar line of argument and excuse put forward tentatively some time back in the *Standard*, has been abandoned. There is nothing here about the contentment of the Directors in the matter of making contracts at top prices with a view to ensuring the supply for the coming winter. If that remarkable contention ever was put forward with the knowledge and consent of the Horseferry Road authorities, it is now very prudently dropped. If it was gratuitously ascribed to them by the newspaper writer, Colonel Makins will have an opportunity for repudiating it on Friday. Unfortunately, the more rational story now told of the rearrangement of the Company's coal contracts on the familiar give-and-take principle is not much more satisfactory. Everybody who knows anything about large coal contracts is acquainted with the class of bargains referred to in the report. They arise somewhat in this way: A contractor may either have the better or the worse of a gas company or committee; but in either case negotiations for a compromise may be set on foot. Supposing the contractor to have nearly completed his engagement to supply coal at a price which happens to be above the ruling rate, he promises to relinquish the tail-end of his obviously profitable contract, on condition that he gets another for a longer time at a rate which is lower than the old one, but which he takes good care shall be in his favour. On the other hand, if the company happen to have a contract running at something under the current rates, the contractor, who sees himself debarred from the full advantage of the market conditions, will not be slow to petition for a release, and will in return offer to renew his engagement for a long time at a figure fixed at something under the ruling price. The exact balancing of these conditions is, of course, the coal contractor's business; and nobody ever charged these gentlemen with incapacity in a matter

of this kind. We have no hesitation in asserting that no board of gas directors or gas committee can meet a coal contractor on equal terms when it is a question of striking a bargain of this nature. They must play, as it were, with their cards on the table, while their antagonist generally has a few up his sleeve in addition to those he holds in his hand. When an arrangement such as that made by the Chartered Directors has to be effected in face of a ring of colliery proprietors, it may be left to be guessed what chance the former have of coming out level. The gas coal ring is no invention of our own; for the Birmingham Gas Committee acknowledge having encountered, and claim to have in a measure defeated it. We shall learn in time the true value of the Chartered bargains.

The reference in the report to the declaration of the rate of dividend is not clear. It is true that a rise of selling price entails, under the sliding scale, a reduction of dividend; but in this case the rise in price is prospective, while the reduction of dividend is retrospective. There is no legal reason why the Board should not have recommended the full dividend for the past half year, during the whole of which the Company have sold gas at the same rate as that which enabled them to divide 13¾ per cent. Probably a question or two may be asked at the meeting concerning this misleading paragraph of the report. There is little else to comment upon in the document besides the announcement of the result of Mr. H. E. Jones's award, which brings to an end the litigation between the Chartered and South Metropolitan Companies; and an announcement that additional capital is to be raised. The former is a matter that will be sure to arouse interest on Friday. Remark has already been made in these columns upon the difference between the manner in which this question of damages as between the two Companies was referred to at the last general meeting, and was subsequently handled by those to whom the Chartered Board confided the settlement. It is not for us to criticize the Referee's award of £5804 besides interest and costs. As might have been expected, the amount is between what was demanded and what was calculated as due on behalf of the defendant Company. The substance of the award will be found elsewhere, and may be examined by the light of the evidence; but the Referee's method of computation must remain a subject for conjecture.

The Company's revenue account shows receipts amounting to £1,144,377 for gas, as compared with £1,146,000 for the corresponding period of last year. Yet meterrents improved by £1093, and stove-hire rose from £2526 to £4882. Residuals show several changes. Coke rose from £235,482 to £241,224; breeze was nearly £1000 better; tar jumped from £79,296 to £109,561; while ammonia fell from £87,379 to £76,755. Altogether, the revenue improved from £1,587,603 to £1,615,630. On the other side of the account will be found a rise of expenditure from £1,067,399 to £1,284,935. In explanation of this, it appears that coals cost £701,428, as compared with £577,254; while wages were increased from £124,569 to £169,558. Somewhat remarkably, repairs and maintenance also show an increase—of as much as £20,000 for the half year. There are increases under every heading in the division of distribution; but the most striking is that for stoves, which has risen threefold during the year. Bad debts have been kept in check; while the testing stations have cost more. The balance carried to the net revenue account is £330,695, as compared with £520,204 for the corresponding half of last year. With regard to the other accounts, it is noteworthy that whereas the quantity of gas accounted for, as already remarked, shows a decrease, although of only 0·36 per cent., the weight of coal carbonized rose from 938,131 tons to 959,951 tons, or an additional consumption of 21,820 tons for a smaller return. It is true that the quantity of gas made was greater; but the private consumption fell off, and the proportion not accounted for shows a conspicuous increase. The capital account records an outlay of £61,734 for the half year; the works being in process of extension both as regards manufacturing and storeage capacity.

Responsibility for Gas Supply beyond the Meter.

NOTHING can be more destitute of general interest, as a rule, than a Gas or Water Provisional Order; but an exception has arisen in the case of the Aldershot Gas Order, as will be seen by reference to our "Parliamentary Intelligence" to-day. A point of districting arose in the settlement of this Order, which repeats almost precisely the circumstances under which The Gaslight and Coke and South Metropolitan Gas Companies recently went to law. The Aldershot Company can sell gas cheaper than their neighbours, the North Camp and Farnborough District Gas Company; and a corner of the Government land, which mostly lies in the district of the latter Company, projects into the Aldershot Company's district. On this corner the Government have a gasholder; and, under a contract with the Aldershot Company, the latter supply gas in bulk to this holder, which is the extent of their responsibility. Where the gas goes after it is delivered into the holder is, as the Aldershot Company argued, no concern of theirs. The North Camp Company objected to any such arrangement whereby the Government, or any other consumer, could purchase gas for distribution in the district which otherwise would be supplied by themselves. Thus The Gaslight and Coke and South Metropolitan conditions were almost exactly reproduced before a tribunal which was constituted, not for interpreting the law, but for making it; the two London undertakings being represented in the matter by the North Camp and Aldershot Companies respectively. The decision of the House of Lords in the Metropolitan case was cited, and naturally influenced the Committee; so that, in the end, they forbad the Aldershot Company to sell gas in bulk outside their district, and within the limits of the North Camp Company, without the consent of the latter. This decision does not settle anything; but leaves the definition as to what constitutes gas supply precisely as it was stated by the House of Lords—that it extends to the burner. How the Aldershot and North Camp Companies will now settle the business between themselves, is their own affair. The notable point about the proceedings before the Committee is that the districting difficulty should have been raised afresh, and left exactly where it was before. Moreover, there is little prospect now that the law will be made clearer. A good deal has been said at different times about suppliers having no responsibility for the gas after it has passed the meter; but it is now certain that their responsibility extends at least to cognizance of whether a consumer does or does not intend to burn it in the territorial limits of a neighbouring statutory undertaking.

Two Demonstrations.

THE labour news of the week is practically restricted to two "demonstrations"—one held on Sunday, the 27th ult., in Hyde Park, for celebrating, under the auspices of the Gas Workers' Union, the anniversary of what was called the Eight-Hour Day; the other held on the previous afternoon at the Old Kent Road Gas-Works, to celebrate the inauguration of the South Metropolitan Gas Company's profit-sharing scheme. Particulars of the latter were reported in last week's JOURNAL so fully that little comment upon it is required here. Mr. George Livesey never needs a paraphraser to explain his meaning, or to clear up any scheme which he has undertaken to expound. Our report of the way in which the scheme is applied speaks for itself; and there can be no mistaking the temper of the present working staff of the South Metropolitan Company. Mr. Livesey and the South Metropolitan Directors used to be popular with their men in the old days, before the present mushroom Socialists had sprung into notoriety; but they are more respected than ever now that they have shown the stuff they are made of. It is painful to turn from this picture to that which was presented in the Park, where the usual mob-orators talked the usual windy trash. The subjection of the cause of the labourer to that of the political schemer—Socialist or Anarchist—was more marked than ever on this occasion. Politicians are at their old game, capturing the workman for the sake of his vote; and they will make a fool of him in the end, as they have done before. Unfortunately for him, as we said last week, if he turns his back upon the noisy but harmless flatterer of the mob for party ends, he runs into the arms of French "citizens," and their equally hair-brained English colleagues of the Communist persuasion. The kind of mental sustenance offered to the demonstrators in Hyde Park may be sampled from the remark of one speaker that "every capitalist was a "Livesey. There were no good employers; the term was "as ridiculous as that of a good thief." It would be an arguable proposition that the condition of the labour market might be sensibly better if the first observation

were true; but as to the second statement, it can only be observed that if men like to go to Hyde Park with bands and banners to talk or listen, as the case may be, to such lunacy, they will be left to do so until they sicken themselves of it. It may be hoped that sooner or later the workman will begin to ask himself what good all this speechifying does for him; and then he will tire of paying for a platform on which Graham, Burns, and the rest, may sun themselves in that notoriety which is their light and life.

Competition in Gas Supply.

An interesting article on competition in gas supply has just been contributed to the *American Gaslight Journal* by Mr. Frederic Egner, wherein many facts which to English engineers are truisms, but which are far from being accepted as yet by the public opinion of the States, are neatly and forcibly set forth. Mr. Egner shows that the result of competition in gas supply is to increase the price of gas to the consumer, and to render cheap gas less possible according to the extent in which it is indulged. At first, of course, competing Gas Companies lower their rates. But eventually they always consolidate; and so two capitals have to be paid for instead of one—"for capi-"tal will seldom permit itself to be annihilated." The sentence quoted is so luminous that it ought to be written up over the portals of every threatened Gas Company in America. Mr. Egner remarks that American gas consumers think that reductions of price in various places have been due to competition; but he disproves this error by reference to leading cases. Wherever competition in gas supply has existed in any part of the United States, there gas is dearer to-day than where there has not been anything of the kind. And yet apparently the great American people are so gullible, that an Addicks (who is simply impersonated gas competition) can make a very good thing of it. We have had nobody on this side of that brand since poor old Flintoff, of unhappy memory; and he vanished twenty years ago after an experience too bitter to induce anybody to repeat his part. No illustration of the difference that exists in some respects between this country and the United States could be more striking than that of the possibilities of the career of a gas competition-monger in the two countries. Here he would simply starve if he could not save himself from this extremity by peddling gas-burners; while across the Atlantic, if he has only assurance enough, and a tolerably good start, he may become a power. Unfortunately, in the States, as elsewhere, it is felt that monopolists of gas supply need some check beyond self-interest, which, notwithstanding all that a particular school of Political Economists may teach, does not invariably secure the greatest benefit to the greatest number. This check from falling into bad courses and incentive to liberal dealing, has appeared to the crude populace of United States towns—in general lamentably ignorant of the results of the experience of other communities—as being most readily procurable through competition. If competition is not to be depended upon for setting a standard of good gas management, what alternative can be made available in its place? Municipal control? Evidently not in the States, according to Mr. Egner's evidence, as well as that of all other candid witnesses. Philadelphia is generally recognized as about the most typical of the cities of the United States. It is one of the oldest, steadiest, and perhaps the most respectable of American towns; yet it is to the history of the Philadelphia Gas Trust that the Yankee publicist refers when he wishes to quench every hope that an American Municipality can ever be trusted to manage a gas undertaking creditably. Commercial competition and municipal example being ineffective for the desired end, legislative supervision alone remains. But here the difficulty arises of the nature and extent of such control, in order that it shall do the greatest amount of good, and inflict the least amount of harm. In Mr. Egner's view, Massachusetts has solved the question entirely to the satisfaction of the people and the Gas Companies. Let us hope that this is so, and that other States will follow suit. Until something of the kind has been done, whereby the security of the capital sunk in gas supply in the States can be understood to depend upon the good behaviour of its owners, rather than as at present upon the bad behaviour of their enemies, it will be impossible to unreservedly regret the failure of plans for the large engagement of English capital in this industry.

WATER AND SANITARY AFFAIRS.

Mr. James Beal and the Vestry delegates have just held another meeting in the Vestry Hall of St. James, Westminster, and have resolved to prepare a Bill for the next session of Parliament, with a view to the purchase of the undertakings of the Metropolitan Water Companies, or the creation of a competing supply. The preliminary expenses are to be defrayed by contributions from the Vestries and District Boards, providing this is found to be legal. But the delegates are not able to see their way beyond the preparation and introduction of the projected Bill. Their hope is that when they have launched their bark, the Government will undertake to navigate it across the parliamentary ocean, and bring it to the desired haven. As much pressure as possible is to be brought to bear upon the Government, in order that they may be induced to undertake this troublesome task. As the County Council are getting parliamentary power to spend £5000 on inquiries and negotiations relative to the water supply, and Mr. Beal is the leader of this business in the County Council, some of the £5000 will perhaps serve indirectly to forward the designs of the delegates. Of course, no harm is done if fair terms can be arranged with the Water Companies; and we observe that Mr. Beal is not amiss in his professions on this point. Mr. O. V. Morgan also counsels the Vestries to approach the Companies in a friendly spirit; while Mr. Rowlands, on the other hand, prefers "fighting." One thing we still perceive among the delegates—that they are not all in love with the County Council; and if this feeling exists in the Vestries, it may have some effect in retarding the contributions. But great weight attaches to Mr. Ritchie's words, and it is sufficiently clear that the Government will not be disposed to create a special Trust or Commission to take charge of the water supply. If the Government are not prepared for a transfer of the water supply to the County Council, the question will probably be hung-up for a time—perhaps in the expectation that there will be a different political cast in the Council after the next election. It is not our place to discuss politics *quâ* politics; but we are justified in estimating the policy of parties as affecting the water supply. It is not unlikely, if we may judge from certain indications, that the Government will introduce a Purchase Bill next year. But the chance would be much greater if the Progressists were less numerous and powerful at Spring Gardens. Whenever it comes to pass that advanced political opinions prevail both in the County Council and in the Government of the day, we may expect to see determined efforts made for the transfer of the water supply, if it has not been accomplished before. As the case now stands, the Vestry delegates have no corporate constitution; and the County Council have no power to introduce a Bill. Either the Corporation or the Government must take the question into Parliament; and if the Corporation were to attempt such a course, the County Council would be frantic. There is a certain amount of jealousy among the local authorities of the Metropolis, which must be taken into account. The Vestries, the County Council, and the Corporation are not united on the water question; and we rather doubt whether the Government are as fond of the County Council as Mr. Ritchie appears to be. Mr. Beal may try his best; and we may credit him with a better understanding of the subject than some who attempt to deal with it.

An extraordinary statement was made in the House of Commons a few days ago by Mr. Tatton Egerton, concerning the quality of the Grand Junction water supply. On the faith of an analysis which for the time was anonymous, the Member for Knutsford produced certain particulars which he considered to prove that the water "was "nothing else than diluted sewage;" and this, he suggested, was the cause of a large increase of enteric fever in the Metropolis. Mr. Ritchie promised to make inquiries, and having done so, he was able in a couple of days to set the matter at rest—telling the House: "I see no ground, in "the communications which I have received on the "subject, for the suggestion that the appearance of the water "or the results of the analysis show sewage contamina-"tion." The only fault to be found was that, owing to heavy floods, the water had been rendered somewhat turbid; and it was desirable that the Company should enlarge their filter-beds—a work which they had under-

taken to carry out without delay. It was rather amusing to find that the "organic ammonia" which had so horrified Mr. Tatton Egerton did not exist in the water, but "was manufactured during the process of analysis." Mr. Ritchie ably vindicated the character of the Grand Junction supply, as shown by Dr. E. Frankland's reports. The House of Commons might well have been reminded in this connection that, only a few years ago, it most unceremoniously—without inquiry—threw out a Bill promoted by the Grand Junction Company for removing their intake higher up the river, and drawing a larger portion of their supply from the subterranean gravel beds.

Are there "two Richmonds in the field?" Does the world contain two gentlemen, each entitled "Mr. Archi-"bald E. Dobbs?" A witness bearing that name gave evidence before the Water Inquiry Committee of the Corporation, saying that, with the exception of some particular cases, he did not think the Water Companies had exceeded the powers conferred upon them by Parliament, in levying their charges on the consumers. In fact, he did not consider that the Companies went to the full extent of their powers. The New River Company had power to make extra charges which, if enforced, "might cause the rates "to go up to an enormous pitch." But a few days after this evidence had been given, a letter appeared in *The Times*, signed "Archibald E. Dobbs," contending that the income received by the London Water Companies ought not to be taken as the basis for an estimate of the value of their undertakings, seeing that a portion of the income consisted of charges illegally levied. Having this view, the writer of the letter adopted a phrase employed by Mr. Deputy Rose-Innes, who protested against "capitaliz-"ing the illegality." Of course, it is perfectly just to argue, as the writer of the letter proceeded to do, that, "if the Companies are levying rates, and are in receipt of "income, part of which is doubtful as to legality, it "would not be wise," on behalf of the public, "to capitalize "that income as a basis of purchase." But then we appeal to the Mr. Dobbs who gave evidence at the Guildhall, in proof that the income of the Water Companies is not in excess of the legal charges, but rather below them. If one Mr. Dobbs is identical with the other, we can only say that we are a little perplexed. The writer of the letter remarks that the Water Companies take no notice of the proceedings at the Guildhall, and signifies that it would be well if they were to offer rebutting evidence, if they can do so. But the Companies have given sufficient reasons for not appearing, and nobody need complain. Some of the witnesses are at variance; and perhaps this will serve to bring out a certain amount of truth without the intervention of the Companies. In this way we find Major Flower, the Sanitary Engineer of the Lea Conservancy, directly traversing some statements made by Mr. Jabez Hogg. Mr. Peregrine Birch, C.E., probably gave a shock to the Committee when he pointed out that, as there was more zymotic disease in Glasgow than in London, it might be inferred that the water supplied to London was purer than that which Glasgow enjoyed. As the Corporation Committee are going to visit Glasgow, this evidence was singularly apposite. When the Committee meet again to-day, they might do worse than invite Sir Robert Rawlinson to appear before them. We cannot undertake to agree with all that this eminent Engineer has to say on the subject. But he so far appreciates the London Water Supply as to consider that the repudiation of the bargain negotiated for the then Mr. Cross by the late Mr. E. J. Smith was "a sad and most costly "mistake," and he appears to believe that £36,000,000 would not be an extravagant price to pay for the undertakings of the London Companies at the present time.

The Gas Institute and their Application for Incorporation.—By direction of the Board of Trade, there was published in two London daily papers last week an advertisement giving formal intimation that application had been made to them "for a licence directing an Association about be to formed, under the name of the Incorporated Gas Institute, to be registered with limited liability without the addition of the word 'limited' to its name." After setting forth the objects for which the Association is proposed to be established—and which were contained in the Memorandum of Association adopted by the members at the Ryde meeting last June—notice is given that any objections to the application must be brought before the Board by the 21st inst., after which date it is quite probable that this application and that already before the Board from the "Institution of Gas Engineers" will be considered together.

ESSAYS, COMMENTARIES, AND REVIEWS.

STATISTICS OF AMERICAN GAS COMPANIES.

In previous issues of the JOURNAL, reference has been made to the very useful volume of statistics of American Gas Companies published at the office of the *Progressive Age*, in New York, under the title of "Brown's Directory of American Gas Companies," compiled and corrected by Mr. E. C. Brown. We have received a copy of the "Directory" for the present year—the third of the series—and can unhesitatingly recommend it to all who are seeking information on the subject of the gas industry of the great country on the side of the Atlantic which is rapidly becoming more familiar to our leading gas engineers. From the volume before us, we find that there are now 1048 gas companies in America, of which 304 operate electric lighting plants. This is an advance of 38 as compared with the figures a year ago. The number of different electric light systems used is 23, as against 21; the lights operated being 31,558 arc and 132,771 incandescent. The systems principally in use are the Thomson-Houston, the Westinghouse, the Edison, and the Brush—the first-named supplying no fewer than 16,927 arc, and 45,055 incandescent lamps. The Brush system is employed about equally on arc and incandescent lamps—the former rather preponderating; but the Westinghouse is practically confined to incandescent lighting. The particulars furnished in respect of each company consist of the capital engaged, the process of manufacture employed, the population of the town, the approximate annual output of gas, the price charged, the number and price of the public lamps, the illuminating power of the gas, and the president and principal officials of the company. There is a list of the companies supplying natural gas, as well as of parent or operating companies. A useful diagram shows at a glance the extent to which the various water-gas processes are employed in America. Of the 1100 towns in which gas is used, there are 367 in which water-gas plants have been erected—the Lowe, or some similar generator superheater process, being a long way the most popular. The different processes are explained in a separate chapter. The work includes lists of the office-bearers and members of the American Associations of Gas Managers; and a large map, showing all the gas towns of the United States and Canada. The book is clearly printed and well bound; and although the price ($5) may appear to be rather high, the great labour attending the production of the book must be borne in mind. It may be mentioned, in this connection, that there is only one State in the Union in which the gas companies are required to make reports to the authorities; and when the difficulties attending the collection of statistics such as those which are to be found in Mr. Brown's "Directory," owing to the reluctance felt by the officials of the companies to supply them except under legal pressure, are considered, the information he has brought together, and made available for easy reference, will not, we are sure, be regarded as too highly priced.

ELECTRIC LIGHTING MEMORANDA.

Electric Lighting not Detrimental to American Gas Companies—The Bromley Controversy—The St. Pancras Lighting Scheme—Progress of the Westinghouse System.

It is only reasonable to suppose that the gas companies of the United States watch the progress of electric lighting around them with particular interest, seeing that they must become the first victims when the new method of lighting enters into the inheritance so freely prophesied for it. The easiest, as well as the most satisfactory, way in which the gas companies whose very existence has been so long threatened can gauge the approach of their extinction, is by observation of their own business returns. In their case, as in all others of gradual suppression of a provisional system in favour of something more perfect, death may be expected to be heralded by a period of decline. Consequently, the keen watch kept by the threatened interests upon their progressive development, is something more than solicitude for increased profits—it is anxiety for life itself. Should a group or section of United States gas companies experience a check in their expansion, it would be interpreted as a sign that their rivals had really begun to occupy that Land of Promise which they have claimed as their birthright. In these circumstances, it is easy to sympathise with our contemporary the *American Gaslight Journal* in the jubilation with which it publishes some significant figures illustrating the phenomenal increase of the gas industry of the States for the first five months of the current year. Last January, our contemporary predicted that the native gas industry was entering upon a twelvemonth that would result in a greater extension than has been experienced for many years. Returns collected from forty different places, representing altogether a heavy output of gas, show an average increase for the period named of 13·2 per cent. as compared with the corresponding period of 1889. This is eminently satisfactory to the companies concerned; and the inferences to be drawn from the fact are not without great value for gas manufacturers all over the world.

In another column will be found a letter from a correspondent who complains of our having repeated, as he considers, without sufficient comment, some statements respecting electricity and gas put forward by a person who is engaged in endeavouring to recommend electric lighting for Bromley. Our correspondent

is particularly interested in the local question; and therefore exaggerates its importance from the general technical standpoint. He must see, however, that it is practically impossible for us to fully criticize all the electrical news that we republish from newspapers and other sources. The most that we can do here is to supply our readers with such general information and rules of criticism that they may themselves deal with any special cases which appear to them to require investigation; and this is exactly what our correspondent has done in the Bromley example. As a matter of fact, however, we alluded to this very case in the "Electric Lighting Memoranda" in the JOURNAL of the 22nd ult., where we complained that advertising electricians "circulate all sorts of statements intended to prove that electric lighting compares in cost and efficiency far more favourably with gas than is really the case." It is palpably impossible for us either to prevent this mischief or cure it by exposing every example we are compelled for journalistic reasons to publish.

The Electricity Committee of the St. Pancras Vestry have just submitted an elaborate report upon the plans, estimates, &c., they have settled for the carrying out of Professor Robinson's electric lighting scheme for the parish, which has already been adopted in principle by the Vestry. The scheme contemplated an installation capable of supplying 10,000 incandescent and 90 arc lamps. The necessary work was divided into seven contracts, for which separate tenders were invited; and the Committee now recommend that tenders to the gross amount of £50,946 should be accepted by the Vestry. The report has been received; but its consideration stands adjourned—the business being too serious for any Vestry to settle off-hand. Although the Committee have every confidence in their electrical adviser, they thought it desirable to obtain the opinions of Dr. Hopkinson and Mr. W. H. Preece. Of course, Dr. Hopkinson would approve of the low-tension system contemplated by Professor Robinson; and Mr. Preece likewise patronizes it—he having turned perfectly rabid in regard to the high-pressure alternating system. Moreover, the great Post Office luminary pats the St. Pancras Vestry on the back on account of the whole adventure; and tells them they are doing a wise thing—which is quite enough to make some of the longer-headed among the Vestrymen pause a bit. He says that "the ratepayers will secure the light at the cheapest rate; and the profits accruing from private lighting can be devoted either to the reduction of rates, or to the expense of public lighting." The seductiveness of this picture would be enhanced if Mr. Preece could indicate any town where it is actually realized, or, if not, could show why St. Pancras may hope to prove the first to do so.

It is as true as ever that one must go abroad to hear news. The first published statements referring to the central lighting station on the Westinghouse system established in London by the Metropolitan Electric Supply Company, have come to us in the report of a recent meeting of the shareholders in the original Westinghouse Electric Company at Pittsburgh. The principal object of this meeting was to increase the capital of the Company by another million sterling; and in support of this policy of the Board, the Chairman (Mr. George Westinghouse, jun.) gave some details relating to the development of the Company's business during the past few months. With regard to the London station, which was originally intended to be of 10,000 lights capacity, but has been increased to 25,000 lights, Mr. Westinghouse remarked that it is now in operation with entire satisfaction, and is the most complete and perfect central station in Europe. This is a claim that has been made before for different stations; but possibly Mr. Westinghouse had the cost of this particular work in mind, and spoke accordingly. We have been promised by the Metropolitan Electric Supply Company that strict comparisons between the cost and performance of the Westinghouse at a typical American station, and one of equal size erected according to English plans, shall be published in due course. It is to be hoped that this will be done as soon as convenient after the stations are in full working order. If Mr. Westinghouse is well informed, however (as is probably the case), the Metropolitan Company have made much better progress so far than their rivals, the London Company.

Mr. W. Bell, late of the Pentland Oil-Works at Loanhead, Mid-Lothian, has been appointed Manager of the Dalkeith Gas-Works.

Mr. T. Duxbury, Gas Engineer of the Darwen Corporation, will shortly have an advance of £50 per annum in his salary, if the recommendation on this subject which the Gas Committee have decided to make at the next meeting of the Town Council is adopted. The Committee also recommend that Mr. Duxbury should devote the whole of his time to the gas department, and not have the direction of the water-works department as well, as has been the case in the past.

A Large Gasholder for Kensal Green.—The Gaslight and Coke Company are making further additions to the storeage plant at their Kensal Green station; involving their construction of a large gasholder to contain 7½ million cubic feet. The designs have been prepared by the Chief Engineer (Mr. G. C. Trewby, M. Inst. C.E.); and the contract for its construction has been entrusted to Messrs. Samuel Cutler and Sons, of Millwall, who recently erected the large three-lift holder at the Company's Bethnal Green station.

THE BROMLEY STATION OF THE GASLIGHT AND COKE COMPANY.

In describing last week the installation, as our electrical friends would call it, of a carburetter for gas in bulk at the Bromley station of The Gaslight and Coke Company, we made a passing remark about these works as being characterized by "magnificent distances." This phrase is eminently applicable to these really handsome works, which deserve more notice than is generally accorded to them by professional visitors to London. Since Beckton was built, it has always been treated as the show-place of The Gaslight and Coke Company. Everybody desiring to be favoured with ocular proof of the grandeur of the largest Gas Company in the world has been sent to Beckton. Technical societies have inspected it over and over again, until there is scarcely a gas manager in the Kingdom, and very few foreigners and colonials, who are not more or less familiar with Mr. F. J. Evans's masterpiece. It has been the policy of Horseferry Road to magnify Beckton in every possible way, both as a point of internal administration and also of advertisement. Naturally better situated than any other station for making gas cheaply, the fullest advantage has been taken of the circumstance; and Beckton is kept going all the year round. Whenever any slacking off is necessary, it must not be there; and, in consequence, all the other stations, with the almost solitary exception of Nine Elms (which is isolated on the other side of the Thames), have fallen into the grade of supplements to Beckton. This policy, although perhaps necessary in the circumstances of the Chartered undertaking, has undoubtedly tended to depreciate the importance in the public eye of all the Chartered stations in comparison with Beckton. Nobody ever sees or hears anything now of the other works, which are therefore less visited by travelling engineers than they used to be in the days when Beckton was not, and Fulham, Bromley, Bow Common, King's Cross, and Haggerston were entities in the hands of independent Engineers esteemed as men of leading in their day. Mr. G. C. Trewby has lately shown some slight indication of a desire to revive in a degree the technical independence of the different stations under his control, in so far as the conduct of experiments by the respective engineers of the works may be held to favour such an interpretation of the Chief Engineer's policy. Thus, for example, the advantages of inclined retorts are to be investigated at Kensal Green; while water gas has been studied at Silvertown. In the old Imperial times, Mr. T. N. Kirkham, at Fulham, was devoted to photometrical experiments, in which he rivalled Mr. Evans; for both Engineers have left instrumental memorials of their researches in this department of science. Now it is Mr. Methven at Nine Elms who chiefly keeps alive the tradition that one of the properest studies of the gas manager is photometry. Mr. Wright, at Bromley, is a specialist also, although as an all-round engineer he generally has two or three kinds of experiments in hand. It would not be wrong to describe him as the mechanical expert among his fellow-Engineers in the service of the Company. He has at Bromley a really fine engineer's shop, where he does all sorts of work that most gas managers are obliged to put out. A mechanician is emphatically the right man in the right place at Bromley; for although the carbonizing plant there musters 1040 retorts, the Manager's chief care is the pumping of the greater supply of gas from Beckton, to which this station is a half-way house on the road to the City. Consequently, Mr. Wright's steam plant is very important and extensive; and he is a master in this branch of the gas engineer's trade. At the present time he is engaged in replacing a Gwynne's exhauster and trunk engine with an engine and pair of exhausters of his own design, from which he confidently expects to get a greatly improved duty. The Wright exhauster is a machine of which not so much has been heard as would have been the case if it had been in different hands. It was devised to reduce the slip, and consequently the oscillation, of the gas in a rotary pump of the class of which the ordinary Gwynne's exhauster is the most familiar example. The pulsation which is such a source of annoyance to users of the common single-slide exhauster is due to the back-flow of the gas from the outlet at a particular point of the revolution of the barrel. This defect can be obviated by the simple bye-pass arrangement devised for the purpose; but this device merely returns a portion of the exhausted gas round to the inlet, to be pumped over again. About 8 per cent. of the total quantity of gas passed through an exhauster fitted with this anti-oscillation arrangement thus has to be pumped twice over, with a commensurate waste of fuel and wear and tear. When the bulk of gas requiring to be pumped attains the magnitude of the Chartered output, the cost of 8 per cent. unnecessarily repumped means something very considerable. Mr. Wright's exhauster has three blades, which are tangentially attached to the eccentric drum, instead of radially. It is difficult, without a model, to explain precisely how these work in obliterating the tendency to oscillation of the stream of gas passed through the exhauster; but the fact is manifest. Whether driving fast or slow, Mr. Wright is able to pump with this exhauster directly into the district mains; and the oscillation, at the nearest point to which a gauge can be attached, is insignificant—disappearing wholly in a very short distance. Mr. Wright claims that this exhauster will pass one-third more gas for the same power absorbed than an ordinary machine with one slide.

Bromley was the last expression of the Imperial style of gas engineering construction before the amalgamation. Like everything else that this Company did, it is in the grand style. The retort-houses are massive and imposing; and all the buildings are disposed with a recognizable aim at architectural effect. The station was laid out before modern ideas about the transport of materials and saving of labour had come into force; consequently, there is a certain old-fashioned aspect about the place, which is heightened, if anything, by the scrupulous neatness and cleanliness everywhere observable but not obtruded. There is no superfluous and irritating dandyism about Mr. Wright's engine-room, or any corner where some gas managers would try to atone with misplaced finery for slovenliness in other quarters. Massive, neat, and roomy, Bromley was built all of a piece; and it is so kept. The settings of retorts are all tens, in the well-known Imperial fashion of superimposed pairs, requiring a travelling stage for the top retorts. This has always been an economical setting for fuel, for reasons which any pyrologist can appreciate; and now that Mr. Wright has fitted it with a gas furnace, there can be no doubt that it can hold its ground against most. The retorts are built of brick, and at the present time most of the renewal work is being done to the end sections only; the middle third of the 20-feet retorts being left in. The endurance of these settings is exceptional; ten years' wear finding them in surprisingly good condition.

There is nothing remarkable about the purifying plant, wet and dry, at Bromley; but the boilers working the pumps in the yard call for some notice, on account of the firing arrangements. Mr. Wright wished to heat them with low-grade breeze, and did not like to be compelled to use a blast. Accordingly, having plenty of room, he constructed a gas generator, and arranged connections from it to the boilers—simply a pipe rising from the floor in front of the boiler, and looking into the furnace. The system worked quite satisfactorily. The generators were charged three or four times a day with their dirty, dusty fuel, and clinkered once a week. They would convert into heating gas anything that contained 40 per cent. and upwards of carbon, and give a satisfactory duty. Gaseous fuel is not considered economical for steam-raising; but from a fair sample of sifted breeze Mr. Wright obtained an evaporative duty of about 6½ lbs. of water per pound of fuel. The gas connections do not prevent any of the boilers from being used with ordinary fuel if required on an emergency when the generators are not working.

The Gaslight and Coke Company have a large and valuable estate at Bromley, which is certain to increase in importance as the neighbourhood becomes more developed. Originally the site of the works was low-lying; and it is at present only approachable on the London side by the handsome bridge over the Creek which also carries the gas-mains. The whole area of the works has been elevated by the Company about 11 feet above the marsh level. It must have been as bad as Beckton and East Greenwich, when the Imperial Company acquired it. At present the development of the station has been checked by the determination of all the resources of the Company to Beckton; but in all probability Bromley has still a future before it. The site of Beckton is not extensible; and it is a matter of opinion whether it has been made the most of for gas manufacturing purposes. When Beckton is full, the other stations will have their turn. If the site of the Bromley works were only a few miles further westward, it would be still more valuable than it is to the Company. Sooner or later, the Chartered district will require a "Phillipston" in the West-end, to balance Beckton in the East; and then there will be two show-places instead of one in the Chartered system. Meanwhile, it may not be trouble wasted to remind the gas engineering profession generally that, although Beckton is, and must be by virtue of its scale alone, if for nothing else, the cynosure of students of the gas supply of London, it is not the only large and instructive establishment of the kind on the north side of the Thames. Visitors who go to Bromley in consequence of our last week's article, to see the carburetting of gas in bulk by petroleum spirit, will lose something if they do not take advantage of the opportunity for inspecting the whole of this, once the chief Imperial gas manufacturing station, and now a most important link in the vast distributing system of The Gaslight and Coke Company.

Mr. J. Totton, of the Gaythorn Station of the Manchester Corporation Gas-Works, has been selected to fill the position of Resident Manager (under Mr. S. B. Darwin, the Engineer and Secretary) of the Portsea Island Gas-Works, in succession to Mr. Walton, who is retiring.

Visit of the Junior Engineering Society to the Richmond Gas-Works.—A large party of members of this Society recently visited the Richmond Gas-Works, on the invitation of the Engineer, Mr. Thomas May, Assoc. M. Inst. C.E., whose assistant, Mr. W. Fendick, was present to conduct the visitors through the works. All the appliances in use—including the West mechanical stoker, and the coal crushing and elevating machine—were fully explained. Much interest was manifested in the new gasholder in course of erection, the support for the crown of which has just been completed, and affords a good example of braced timber work. At the conclusion of the visit, the members were invited to partake of refreshments by Mr. Fendick, to whom a cordial vote of thanks was passed for the manner in which he had received the party.

GENERAL CHARLES ROOME.

We have to record the death, on June 28, in his 78th year, of General Charles Roome, of New York. Deceased was the son of Nicholas Roome, the Superintendent of the Old State Prison in that city; and in 1837 he became attached to the Manhattan Gas Company in the capacity of Assistant-Engineer. From this position he rose in 1842 to that of Engineer-in-Chief; and in 1854 he succeeded Mr. H. Young in the presidency. This office he held up to the time of the formation of the Consolidated Gas Company in 1884, when he undertook the direction of the new Company. Having brought everything into working order, General Roome expressed his intention of not seeking re-election. His colleagues declining to relieve him of all active duty, he reluctantly agreed to serve on the directorate, and to undertake the duties of Chairman of the Executive Committee, which position he filled at the time of his death. General Roome was one of the projectors of the American Gaslight Association, and was elected to the presidency at the initial conference. He did not preside at the first annual meeting, held in 1873, owing to his absence in Europe; but he was repeatedly re-elected, until, on the occasion of the seventh annual meeting, he peremptorily declined the honour. He was, however, made the first honorary member. He was also an honorary member of the New England Association and of the Society of Gas Lighting. As indicated by his title, the deceased gentleman had served his country in a military as well as in a civil capacity. In September, 1861, he organized the 37th New York Volunteers, of which he was chosen Colonel. His regiment served in Maryland as well as in Pennsylvania; but was re-called to New York in 1863 to assist in quelling the "draft" riots then convulsing the city. In recognition of his services, Colonel Roome was brevetted a Brigadier-General of Volunteers; the commission being issued by President Johnson. General Roome was connected with many benevolent, social, and business institutions; and had taken high degree as a Freemason. His funeral, which took place on the 1st ult., was a very imposing ceremony; being attended by prominent representatives of the gas industry, and of nearly all the leading Masonic organizations in the part of the State with which he was associated, as also by most of the officers of Grand Lodge—the assemblage numbering not less than 2000 people.

Farewell Dinner and Presentation to Mr. G. B. Smedley.—On Wednesday last, Mr. G. B. Smedley, Assoc. M. Inst. C.E., who has lately relinquished the position he for some years held as Engineer and Manager of the Gravesend Gas Company, was entertained at a farewell dinner at the Rosherville Hotel, to which he had been invited by those who had been associated with him. The Chairman of the evening, in proposing the health of their guest, spoke of Mr. Smedley in very eulogistic terms. He alluded to the difficulty in which a gas manager found himself in having to give satisfaction to his directors and to the consumers; and referred to the special ability required to produce gas of really good quality. Mr. Smedley was, he said, a thoroughly competent man in this respect; and he complimented him thereon. The toast having been heartily received, Mr. Smedley responded in suitable terms. Subsequently one of the employees presented Mr. Smedley, on behalf of himself and his fellow workmen, with a valuable meerschaum pipe, in a case, as a token of their regard.

The Award in the Chartered and South Metropolitan Arbitration.—Our readers will see from the report given in another column, to be presented at the meeting of The Gaslight and Coke Company next Friday, that the Referee (Mr. H. E. Jones, M. Inst. C.E.) in the recent arbitration proceedings between the Company and the South Metropolitan Gas Company—which, as will be remembered, arose out of the action brought by the former Company against the latter for breach of the districting arrangements—has made his award. He finds that the damages sustained by the plaintiff Company amount, exclusive of interest, to £5804 15s. 2d. As regards the question of interest, which was a matter of contention between the parties, he finds that the whole of the sum of £5804 15s. 2d. would, but for the acts of the defendant Company, have been paid to the plaintiffs by their customers in various quarterly instalments extending from Dec. 31, 1886, to Sept. 30, 1889; and, further, that by reason of the acts of defendants, plaintiffs not only suffered the loss of the amounts of these instalments, but were also deprived of the advantages that would otherwise have accrued to them from the employment or investment thereof from and after the dates when they respectively would have become payable. He finds that a reasonable and proper way of ascertaining the amount of loss which the plaintiff Company sustained thereby, is to calculate interest at the rate of £3 per cent. per annum on the instalments from the date when they would have been respectively payable up to the date of his award; and he works out the total amount of such interest at the sum of £388 16s. 10d. Should the Court be of opinion that this sum represents an item of damage legally recoverable by the plaintiffs in the action, and that the mode he has adopted for the assessment thereof is a legal one, he finds that the amount of the damages sustained by the plaintiffs must be increased by the sum of £388 16s. 10d., making the award amount in the whole to a sum of £6193 12s.

COMMUNICATED ARTICLE.

THE CHEMISTRY OF ILLUMINATING GAS.

By Norton H. Humphrys, Assoc. M. Inst. C.E., F.C.S.

XLIV.

No theoretical calculation or laboratory experiment can ever furnish anything like a complete indication of the value, in practice, of coal as a gas-making material, because several practical conditions come in with the actual day-to-day working, that do not appear in the experimental test. In the latter the operator is only concerned in developing the best value out of the material, and can alter the weight of his charges, the size of his retorts and condensing pipes, &c., as may appear necessary. But very little in this direction can be done at the gas-works, where working conditions are the first thing considered. Single retorts are about 9 feet long; and through retorts double this length—not because such a length is found to be in any way favourable to the results obtained, but because it is convenient for the manual system of drawing and charging. So with the width and height of the retort, the weight of each charge, and the period of time allowed for carbonization. Very little attention is paid to the effect of this on the reactions produced in the process of carbonization. The chief considerations are to have a charge that can be included in two scoopfuls, and will leave a residuum of coke that can be readily received in one barrow, and drawn away by one man.

Perhaps this state of things is inevitable, so long as the horizontal retort and manual labour for drawing and charging are found to be the only practical methods of retort-house working; and it may be useless to urge such a question as, "Is the 9 feet retort the best length for securing the maximum illuminating value from the coal?" or, "Are six-hour charges of 3 cwt., or four-hour charges of 2¼ cwt. each the most suitable periods and weights of material?" But there are signs—in the introduction of machinery for drawing and charging, the departure from the time-honoured horizontal position of the retort, and the introduction of conveying machinery in place of the barrow and the shovel—that the operations of the retort-house are about to expand beyond the narrow ruts in which they have been confined, either by custom or necessity (I will not say which), for so many years. Under these circumstances, it may be pertinent to throw these practical considerations on one side, and approach the subject from a chemical point of view only. If investigation shows that a considerable alteration may be effected in the size and shape of our retorts and the weight of each charge of coal, the resources of our engineers and mechanicians are not likely to be over-taxed.

The operation of carbonization may appear at first sight to be very simple; but further inquiry shows it to be extremely complicated. The various conditions concerned have received a considerable amount of attention lately; and the reader may be referred to the views of Mr. W. Foulis, as expressed in the course of his Inaugural Address to The Gas Institute in 1887,* and to an essay on the subject that subsequently appeared in the JOURNAL;† also to a paper on the same subject, reviewing some American researches,‡ to a paper by Messrs. Folkard and Heisch, read at a meeting of the Southern District Association of Gas Managers,§ to a paper entitled "Studies in Destructive Distillation," read by Mr. Lewis T. Wright at a meeting of the Society of Chemical Industry, together with a review thereof,‖ to a contribution by Professor Watson Smith to the same Society,¶ and to the numerous papers on the subject of the Dinsmore process that have been read within the last twelve months. All these have appeared so recently that it is unnecessary to attempt anything in the way of a summary of their contents; and a perusal of them will show that the work of carbonization is an operation capable of being developed far beyond getting up a good heat in the retort, and then putting in as much coal as can be properly worked off in the time allowed.

One cannot but express surprise, when looking for data on such topics as the effect of the length of the retort on the quantity and quality of the gas produced, the influence exerted by the weight of the charge, or by the sectional area, thickness of the retort, &c., to find that none are forthcoming. Murdoch is said to have experimented with different sizes and shapes of retorts; but I do not know that anyone has followed this example. Although coal has been carbonized in great quantity for many years, it seems to be generally taken for granted that all we have to do is to get it into the retort and to work it off dead. A general, but nevertheless vague, opinion in favour of high heats and short periods of charging, based upon the results of practical experience, together with the obvious deduction that the charge should not remain in the retort after it has been burnt off, represents the sum of our knowledge on the important subject of carbonization. It would be difficult to get a definite statement on the rudiments of the subject, as involved in a reply to the question, "Why do higher heats give better results?" from the average gas engineer.

In order to arrive at some idea of the actions that take place when a charge of coal is thrown into a hot retort, let us take as an illustration a cylinder of iron—say, 18 inches in diameter by 9 feet long—heated to a temperature of 300° Fahr., and suppose that a charge of sand saturated with water, sufficient to half fill it, could be suddenly introduced by means of a scoop. This is, of course, merely an illustrative example; and I should not advise anyone to actually make the experiment. The effect would be a sudden cooling of the cylinder, together with some evolution of steam. Assuming that the latter could pass freely away, the temperature of the mass would gradually rise to 212° with a rapidity proportioned to the quantity of heat supplied to the exterior of the cylinder. So long as the temperature of the sand and water remained below boiling point, wet steam would pass off. There would not only be *bonâ fide* steam formed at 212°, but a quantity of water vapour given off below this temperature. As soon as the whole mass reached boiling-point, pure steam would be evolved until the whole of the water was given off, and the mass thoroughly dry. Then, and not till then, the temperature of the charge would begin to rise, until that of the cylinder was reached. Sand is not a good conductor of heat, so some time would elapse before the whole mass was dried through. The heat would reach the centre portions by conduction from particle to particle, and by contact with steam evolved from parts nearer to the surface of the cylinder. A certain portion of the steam would have to pass through some few inches of the sand before it could escape, and it would probably come in contact with parts colder than itself. Partial condensation would ensue, attended by the transference of heat to the colder parts.

Some of the water vapour, given off below 212°, may be raised above that temperature, and converted into dry steam, by contact with the interior surface at the upper part of the cylinder, or some dry steam may be condensed by contact with colder parts of the charge, or of the cylinder itself, before it has recovered from the sudden chill due to the introduction of the cold charge. The period required for such recovery will be retarded by the passing away of steam and vapour, on account of the loss of heat in the latent form. The period required for complete drying will vary according to the supply of heat, and this will be effected in its turn (1) by the conductive power of the substance of the cylinder, and (2) by the conductive power of the sand as determining the rate of transference of heat to the interior parts of the mass. The effect of increasing the heat of the cylinder in the first place—that is, before the introduction of the charge—would be the shortening of the period required for the recovery from the effect of the sudden chill, and consequently a material reduction in the quantity of water vapour, below 212°, that escaped. The effect of maintaining the heat more fiercely after the introduction of the charge would be to facilitate the introduction of heat into it, and thus to shorten the period required for complete drying.

Now, the extent to which the carbonization of coal has been studied by Mr. Foulis and Mr. Lewis T. Wright, as shown in the data published respectively by these gentlemen as above referred to, warrants the supposition that there is a great deal of similarity between the effect of introducing a charge of coal into a retort heated considerably above visible red heat, and that following the charge of wet sand in this example. For the boiling-point of water we have only to substitute a point which may be termed the "gasification point" of coal, which is about 1200° Fahr. It may or may not be constant for all kinds of coal; but as regards any one kind it is reasonable to assume that there is a certain point at which the volatile constituents are given off, and that any further supply of heat only accelerates the evolution of the gas and does not raise the temperature of the mass until the volatile constituents have been displaced. Just as water vapour is liberated below 212°, so we have heavy condensable vapours given off below the "gasification point." A considerable portion of the gases, after evolution, have to pass through a few inches of material, and also in contact with the interior surface at the upper parts of the retort. They may thus be subjected either to cooling or to heating influences. It is possible to conceive some portions being partly condensed or absorbed by contact with cooler parts than themselves; or, on the other hand, being heated and further decomposed.

In the case of water, however, we have only one substance, and the action is entirely of a mechanical character; but with the coal there are a large number of substances, having various degrees of affinity one with the other, and there are a large number of chemical reactions to come in and influence the final result. Still, the main effect of either increasing the temperature of the retort at first, or firing it energetically after introducing the charge, is similar. There will be a shorter period during which the surface of the retort is cooled below gasification-point, and therefore a smaller proportion of vapours produced below that point. There will also be a greater chance for the vapours, after escaping from the coal, to be raised to gasification-point on their way to the outlet, and thus converted into permanent gas. But here we must notice an important divergence. The steam once obtained in that form will stand exposure to additional heat to an extent that greatly exceeds anything it is likely to meet with in the cylinder, without being decomposed; it will not, by any chance, be overdone. But the operation of making illuminating gas is one of somewhat limited degree. It may possibly be overdone, resulting in the production

* See JOURNAL, Vol. XLIX., p. 1160.
† See Vol. L., p. 835. ‡ *Ibid.*, p. 134. § *Ibid.*, p. 879.
‖ *Ibid.*, pp. 275, 281. ¶ See Vol. LIV., p. 1009.

of a gas of very inferior illuminating power. In the case of the water, we have only the possibility of a little wet steam escaping at the beginning of the charge; but with the coal there is not only the evolution of condensable tarry vapours at the first, but, as the rate of evolution of gas decreases, there comes a time when it is exposed for such a period to the heat of the retort as will suffice to render it absolutely useless as an illuminating agent. Messrs. Folkard and Heisch go even further, and call the tail end of the charge a gas of active *minus* power in respect to the ultimate lighting value of the whole yield.

It will be convenient to divide the effect of the heat as regards the production of gas into (1) the primary, as causing the evolution of volatile matter, and (2) the secondary, as relating to the effect exercised by the heat on the volatile matter after it is formed. The primary effect is similar to that obtaining in the case of water; but the secondary one may not only be beneficial, by converting tarry vapours into permanent gas, but also hurtful, by decomposing good gas into non-luminous gases, with deposition of carbon. The effect of this secondary action on the ultimate result will depend on the degree of excessive temperature above gasification-point, and the rate at which the gas is generated as fixing the length of time during which the product is exposed to that temperature, which will be determined by the rate at which the gas is given off, and the area of surface over which it has to travel before leaving the retort.

A Combined Gas-Engine and Pump.—In the JOURNAL last week we described the "Nash" gas-engine, manufactured by the National Meter Company, of New York. The Company have now constructed the engine in combination with a pump on one base; thereby obtaining rigidity and compactness. It is claimed for this appliance that, with gas at the New York price, it will raise 1000 gallons of water to a height of 75 feet for 2½ cents.

The Crowded Subsoil of New York.—According to the *Progressive Age*, the last act of the New York Grand Jury, sitting in June last, was to make a "presentment" in reference to the present crowded state of the subsoil of the public thoroughfares of the city. From evidence submitted to them, they came to the conclusion that the contiguity of steam, gas, and water pipes, sewers, and electric subways under the principal streets was an evil which demanded immediate relief. Then, again, "the uptearing of the pavements caused by the laying of these pipes, and their frequent repairs, causes an obstruction to travel and a needless expense to the city; the overheating of the soil and the adjacent water-pipes is destructive to the asphalte pavements, and makes the Croton water unfit to drink; the saturation of the soil with poisonous gases and dirty fluids is damaging to health; and the explosion of gases and the liability to explosion by steam are constant menaces to life and limb." These evils, they point out, have increased from year to year, and will continue to increase unless some remedy is found. They suggest that steam and gas companies be held to strict accountability for all damages occasioned by their neglect; that penalties should be rigidly enforced against companies who delay repairs and cause obstructions; and that no more permits should be granted for the laying of additional steam and gas pipes in streets that are now overcrowded. As a future remedy, they suggest the appointment of a Commission of strictly non-political experts, to consider the feasibility of vesting the management of street paving and of all underground pipes and sewers, in some responsible body, and of devising a system by which the benefits of steam, gas, water, electricity, and sewage can be had more safely, and with less official obstructions.

Laying a Submerged Water-Pipe.—In the University of Michigan *Technic*, Mr. G. S. Williams gives an account of the laying of a submerged water-pipe at Grenville (Mich.), during the construction of the water-works there in 1883. In the progress of the work it was necessary to lay a line of 12-inch pipe across Flat River, some 200 feet wide, in water about 4 feet deep. By manipulating dams above and below the point, it was possible to get the water down to about 2 feet in depth. Eighteen lengths of 12-inch pipe were laid in place in the water; and then raised by means of jacks placed on horses above, from which the pipe was suspended, until the joints were out of water. The pipe was then set to the proper curve, and caulked with lead in the usual manner, after which it was lowered by means of the screws worked simultaneously, until parts of it bore on the bottom. The steam fire-engine was then brought to the crossing, and two lines of hose taken out with 1⅛-inch nozzle; streams from which, at a pressure of about 140 lbs. at the engine, were played upon the bottom underneath the pipe, and the earth was scoured away until the pipe came to a bearing for its entire length. The pipe was then released from the screws, and the jets were worked along the pipe until it was buried its full depth in the river bottom, which consisted of sand and gravel. The jets worked better in the gravel than in the sand. This method of laying the pipe was found to be much more economical than by means of a coffer dam; and it was in every way successful. The pipe was tested before being covered, at a pressure of 160 lbs. per square inch, and only one joint was found to leak, and this was immediately stopped by a few strokes of the caulking-iron. It appeared, however, in sinking the pipe further, a nozzle or pipe that was bent to a curve would be preferable to a straight one. In some places the pipe was sunk to a depth of 18 inches.

TECHNICAL RECORD.

THE LOOMIS PROCESS OF MAKING GASEOUS FUEL.

At the Meeting of the Institution of Mechanical Engineers held in Sheffield last week, under the presidency of Mr. J. Tomlinson, Mr. R. N. OAKMAN, jun., read the following paper on the above subject:—

The Loomis process for generating gas, which has recently been introduced into the Sheffield district, produces three kinds of gas: producer or generator gas; water gas, for fuel; and carburetted water gas, for lighting. It is with the two former only, and with their application as fuel, that the present paper deals, without entering at large into the general subject of gaseous fuel.

The apparatus employed consists of a generator or producer; a vertical boiler; an exhauster and engine; an auxiliary boiler; two gasholders; and suitable steam, water, and gas tubes and pipes, with proper valves and seals. The generator is cylindrical, constructed of iron or steel, from 7 to 10 feet diameter and 12 to 13 feet high. The lining is of firebrick, but employed in a different method from that in other water-gas generators. The vertical boiler is usually made 3 feet in diameter, and from 17 to 20 feet high. It is of the multitubular type; and is connected at its base with the base of the generator. The exhauster or blower is preferably of the class known as positive; and it is connected with the top of the boiler, and driven by an engine direct. There is a washer or scrubber provided, through which the water gas passes to one of the gasholders.

The fuel used in the generators is bituminous coal; and slack is found to work the most satisfactorily. It is introduced through a feed-door on the top of the generator. Air is also admitted through the same door; and, by means of the exhauster, it is drawn down through the fresh charge of coal, and then through the hot fuel bed beneath. The resultant producer or generator gas is drawn down through a superheater in the bottom of the generator; up through the vertical boiler to the exhauster; and thence it is delivered into a gasholder for supply to the furnaces. This gasholder may be small; having to act only as a governor. The heat given off by the gas in passing through the vertical boiler is utilized in producing steam for afterwards making water gas, as well as for working the engines.

During the time of bringing the fuel to a state of incandescence, the feed-door on the top of the generator is open; thus allowing the attendant to see constantly the condition of the fuel bed. This first half of the operation requires from four to six minutes, after which the exhauster is stopped, and the valve between the boiler and exhauster closed, as is also the feed-door; and steam being introduced through the superheater in the bottom of the generator, passes up through the incandescent fuel. The resultant water gas goes away through a seal to the washer, and thence into another gasholder. This second half of the operation occupies about the same time as that required for bringing the fuel to incandescence.

The working of the process is exceedingly easy and simple; no skill being required beyond that which a man of ordinary intelligence, and without any previous experience in gas making, would acquire in a week's practice. The combustion of coal in the generators is so nearly perfect that there is great freedom from clinker. They have been worked daily for over six months, without requiring the fires to be drawn or to be broken up. The explosions so common in water gas generators are avoided.

As it is bituminous coal that is introduced into the generator and there coked, the gas obtained is of excellent quality; and after having passed down through the hot fuel bed, it is free from tar, and may readily be conveyed through pipes to any distance required. Instead of making water gas in every alternate stage for the same length of time as producer gas, the generator may be worked on producer gas alone; steam being then admitted at various points while the exhauster is running and the operation of making producer gas is going on. It is, therefore, not requisite to alternate the action of the generator so frequently as every four to six minutes; but only so much water gas need be made as may be called for by the requirements of the work to which the process is applied. From the gasholder, the gas is supplied under pressure into the furnaces; the supply being regulated by means of an ordinary gas-valve. Thus a uniform heat is always maintained.

This producer or generator gas is now being used successfully for reheating, annealing, and hardening metals; for firing tiles and pottery, porcelain, gas-retorts, boilers, &c.; and where purity of flame is desirable, it is of special advantage, being free from tar and smoke. When the generator is worked so as to obtain the largest amount of water gas possible per ton of coal, the generator gas produced in bringing the coal to incandescence is equal for fuel purposes to rather more than half the coal consumed. That is to say, if one ton of coal is consumed in the generator to make 40,000 cubic feet of water gas, the producer gas also obtained from that one ton will exceed in value half-a-ton of coal applied to reheating, &c. The percentage of combustible matter in the producer gas ranges from 30 to 40 per cent. according to the quality of the coal used.

The water gas made by this process differs from any other water gas in its peculiar and strong odour, in consequence of which any leaks are readily detected; and it burns with a flame equal to 4 to 10 candle power, varying with the quality of the coal used and the quantity of gas made per ton of coal. This is due to the hydrocarbons taken up by the water gas from the bituminous coal. The calorific power of the gas is thus increased; and in the experience of those who have used water gas made from anthracite coal, from coke, and also from bituminous coal, the gas made from the latter has been found the most suitable for the treatment of steel, having a higher calorific power than water gas made from either anthracite coal or coke. As an indication of its merits for heating steel, it has been proved to furnish the best heat for treating watch-springs; giving a better quality of springs than can be obtained by the use of any other fuel. It has been in use a year or more for this and other purposes at the Waltham Watch-Works in the United States; and for a longer period in heating fine steels for forging, hardening, and tempering, in cutlery and similar work.

The quantity of water gas produced per ton of coal consumed in the generator ranges from 35,000 to 45,000 cubic feet; some coal yielding more water gas than others. In respect of stability, the gas is well fixed; there is no condensation.

The following are analyses of two gases taken from the gasholder.

	Water Gas.	Producer Gas,
Carbonic acid . .	4·5 per cent. . .	7·4 per cent.
Carbonic oxide .	36·6 ,, . .	22.5 ,,
Hydrogen . . .	57·4 ,, . .	13·2 ,,
Nitrogen . . .	1·5 ,, . .	56·9 ,,

While the process recommends itself for making water gas, the use of this gas alone as a fuel for all purposes is not advocated. It is in the production and application of the two gases jointly—producer gas and water gas—that the greatest economy appears to lie; and it is therefore according to this combined method that the development of the plan has taken place. First of all the raw coal becoming coked in the generator is raised to a state of incandescence; and the gas thus produced is employed where lower heats are required, as in re-heating, annealing, boiler-firing, &c. Afterwards the incandescent coke is used to produce water gas, for employment where higher heats are wanted—as for melting metals, and for heating metals in small forges or furnaces where regenerating is not practicable, and for any purpose where high heat on light work is desired. The fuel economy differs much with the works and with the conditions under which it is done.

Two examples may be given, which are probably the extremes in the application of water gas, and are the results of practical working. In heating steel in small forges for making files, cutlery, and similar work, the fuel saving over coal or coke firing has been found to exceed one-third. On the other hand, in melting steel in crucibles, the economy in fuel is fully 75 per cent. as compared with coke firing. Beyond the saving in fuel, it will be understood that there are also other large economies, to which reference need not be made here.

Many leading works in the United States are using the process; and in the Sheffield district it has been for several months in practical operation in the works of Messrs. Thomas Firth and Sons, and is now being introduced into those of Messrs. Howell and Co., and Messrs. Newton Chambers and Co.

In the course of the discussion on the paper,

Professor J. O. Arnold (of the Sheffield Technical School) referred to the question of clinker; pointing out that the author had stated that the combustion of coal in the generator was so nearly perfect that there was great freedom from clinkers. This he was unable to understand, as the ash and incombustible matter could not be burnt, however favourable the conditions might be for consuming the fuel. He would like to know if the Loomis system of producing gas had been applied to the manufacture of steel by the open-hearth process. The author had said that, owing to the hydrocarbons taken up from the bituminous coal used for the water gas, the calorific power of the gas was increased. The important point, to his (Professor Arnold's) mind, was the calorific intensity; but it would be interesting to know to what extent the heating power of the gas was increased in the manner specified. Another point to which he would call attention was the analysis of water gas given by the author. This included carbonic acid, carbonic oxide, hydrogen, and nitrogen. All these were inodorous; but the author had stated that the Loomis water gas differed from other gases in possessing a peculiar and strong odour. If this was the case, it must be due to the hydrocarbons from the coal. As, however, these did not appear in the analyses, the latter were manifestly incomplete. This point required explanation. The author also said that this water gas had been proved to furnish the best heat for treating watch-springs; and this was furnished as an indication of its merits for heating steel. He (Professor Arnold) would be glad to know whether this was owing to chemical or to physical causes, due to the more even heating of the steel. At the end of the paper, it was stated that an economy of fully 75 per cent., as compared with coke firing, was obtained when melting steel in crucibles by using the Loomis gas for fuel. This, the speaker said, was a very remarkable statement; and Sheffield people would be glad to hear more on the subject.

Mr. Lupton said he could not understand how the air was heated in the preliminary part of the process. As the air was admitted at the top, he should have expected the greatest heat to occur there. Was there any preliminary process of firing up from below; and, if so, where did the gas go? It would also appear that the steam would cool the fuel when admitted; and he wished to know if this was the case.

Mr. Hoyle (of the firm of Messrs. T. Firth and Sons), at the request of the President, said he was not in a position to give definite figures as to the saving effected by the adoption of the Loomis process, which had lately been introduced into their works. It was claimed, however, that an economy of 75 per cent. was effected. This might be; but he felt he should be certainly within the mark in putting down the saving in the cost of fuel at 50 per cent. over the old way of melting steel in the crucible with coke. In the latter case 80 per cent. of the heat went up the chimney; and there was the loss due to letting down the fires at night and renewing them in the morning. When using gas, however, the work went on day and night; so that there was no loss from the latter causes. As a practical fact, the use of gas was so satisfactory that arrangements were in prospect to put in ten or twelve more sets of the apparatus, in addition to the two now in use. The experiments were very satisfactory, not only for the manufacture of crucible steel, but also in the Siemens furnace also. With the gas-making plant they were able to burn small coal; whereas for the old furnaces, it was necessary to use coke.

Mr. Lupton asked at what temperature the producer gas left the generator to pass to the boiler.

Mr. Oakman said it would be from 2000° to 2500°.

Mr. John Head said he was not acquainted with the Loomis gas; but he knew it was no better than ordinary producer gas, and therefore he did not see the necessity for all the complications attendant on its production. If regenerators absorbed all the waste heat, there could be no saving beyond that effected in a process in which they were used. His own researches had shown that the producer gas obtainable from 100 tons of coal had as great a theoretical heating power as the water gas obtainable from 99½ tons of coal. But, in the combustion of water gas, steam was formed and subsequently condensed; and the heat expended in forming this steam could not be recovered in the regenerators. Water gas would, however, work more quickly; but it was a question whether this advantage could be utilized, as the bricks used for lining furnaces were not sufficiently refractory to stand for any length of time with the more rapid working and higher temperature. A Siemens furnace would last generally six months, although it might remain good for as long as two years. It must be remembered that if it were worked twice as fast, it would only last probably one-eighth the time.

Sir Lowthian Bell said that in the discussion on water gas fuel which took place in Paris last year during the meeting of the Iron and Steel Institute,* he had raised many objections to the use of this description of gaseous fuel. These objections did not, however, all apply to the system described by the author. The statement had been made in Paris that the days of burning solid fuel were passed; but he would say that, unless there were good and strong reasons otherwise, the obvious loss—say, 30 per cent.—of converting fuel into gas would render this course undesirable. Conditions, however, often arose in which gaseous fuel might be favourably adopted, and the loss more than compensated for. For instance, in burning coal in the ordinary grate, there was the loss of heat up the chimney—heat that the regenerative system, applicable to gaseous fuel, enabled them to recover. Water gas was the result of decomposing steam into carbon monoxide and hydrogen; and it was impossible to get from these more heat than was obtained by burning the coal directly. If a kilogramme of hydrogen were burnt, four times the heat due to burning a kilogramme of coal might be obtained; but in that case it would take four times the heat in the kilogramme of coal to get the hydrogen. This was the theoretical aspect; but, of course, there were all the losses actually experienced in the practical application of the process. It was said that a higher temperature could be obtained with the water gas; but it would be well to consider whether a higher temperature was wanted. All the heat required might be obtained from producer gas; and there was the difficulty of getting materials sufficiently refractory to stand the greater heat. Nevertheless, water gas was useful for many purposes. He would lay it down as an axiom that, in the matter of obtaining the greatest heat from a given amount of coal, to burn it as solid fuel was the best, to convert it into producer gas was the next best, while worst of all was to waste the heat of a large quantity of coal in producing hydrogen gas.

Mr. Oakman, replying on the discussion, said a question had been asked by Professor Arnold as to the analyses quoted. These had been made in Philadelphia, and gave the leading elements only; the olefiant gas not being included. This would amount to from 3 to 3½ per cent. The quantity of gas made by the apparatus in question was about 38,000 cubic feet per day; but this depended upon the coal. The thermal units per cubic foot of gas would be 250 to 400. In answer to the question as to the way in which the generator was fired, when the fire was first started 2 feet or 3 feet of coal were put in, and the fire was ignited at the top. Coal would then gradually be filled up to above the ports; and the fuel-bed would soon get incandescent

* See Journal, Vol. LIV., pp. 699, 747.

to within from 6 to 10 inches of the top. The greatest heat would be at the bottom; and as the air went in at the top, the producer gas would pass away clean from the incandescent fuel. The average quantity of coke required for melting crucible steel in the old furnaces was about 3 tons per ton of steel, when working by the ordinary process. With gaseous fuel the consumption of the same coal as was used for making the coke was 1½ tons per ton of steel; but at the same time half its value was obtained in producer gas. He had not intended to allude to furnaces; but as the subject had been brought up, he would say that the furnaces using this gas had been in operation from four to five months, and they appeared to stand perfectly well. The flow of gas was quite under control, and the heat could be regulated from 1500° to 5000° Fahr., just as might be required. The author had no more belief than Sir Lowthian Bell in the universal application of water gas; but he was sure it was good for some things. He would not use it in steam-boilers or for melting pig-iron; but he was of opinion that it might be applied with advantage to puddling furnaces. With regard to the clinker question, he did not mean by perfect combustion that the unconsumable parts of the coal would be burnt, but that the fires burnt so freely that clinker was not formed. He had been told that air forced in at the top of the generator with blast would not succeed, as the ash would accumulate at the top. This, however, proved not to be the case, as the ash came through to the bottom. The combustion was so perfect that there was no trouble from the melting of ash into clinker at the bottom.

WESTERN (U.S.A.) GAS ASSOCIATION.

The Thirteenth Annual Meeting.

(*Continued from p.* 32.)

At the close of the paper by Mr. Chollar on "The Relative Value of Gaseous Fuels" a short discussion took place. Subsequently, Mr. G. T. Thompson read the paper, giving his "Impressions of British Gas-Works," which appeared in the JOURNAL on June 24 last (p. 1182).

On the second day of the meeting,

Mr. G. G. RAMSDELL, of Vincennes (Ind.), submitted the report of a Committee appointed last year to consider the subject of gas companies' accounts. He said the Committee found the topic too wide to be included in one report, and therefore they had confined their attention to arriving at a uniform system of representing the cost of the gas in the holder, and the expense of distribution; leaving the other details of the subject to be dealt with subsequently. After referring to the want of uniformity at present existing, which renders it impossible to compare the results in one town with those obtained in another, he instanced the law of Massachusetts, in which State the Gas Commission have issued an established form for the annual return of each company, as illustrating the advantages that would ensue when one undertaking could be compared with its neighbours on an equal basis. In order that any system should become uniform, Mr. Ramsdell remarked, it must go further than the mere acceptance by the meeting, and each member must adopt it and work to it. The standards of weight agreed upon by his Committee were the ton of 2240 lbs.; the bushel of 2150·42 cubic inches for lime, and the heaped bushel of 2747·7 cubic inches for coke; and the gallon of 231 cubic inches for liquids. The report then proceeds to give instructions for arriving at a just and accurate account of the cost of the materials used, such as coal, oil, &c., and points out that the labour should include a fair proportion of salaries of managers and foremen, as well as wages of stokers and coal wheelers. The Committee recommend that, in the case of a general manager, one-fourth of his salary should be charged to manufacture, one-fourth to distribution, and the remainder to management; and that a manager of works and distribution only, doing no office work, should be charged two-thirds to manufacture and one-third to distribution. The purification should include the actual cost of materials and of labour. All minor items, such as oil, water, &c., should be included; also maintenance and repairs, with the renewal of retorts. As the latter item was subject to variation from year to year, they preferred a fixed charge based on the average of several years' working. All expenses, such as delivery, incurred in connection with the sale of residuals should be charged to this account. The recommendations for distribution and sundries are similar to the plan followed in England. These items refer to the cost of the gas made. In order to arrive at the loss by leakage, the following rule is recommended: Multiply by the percentage of leakage, and divide the result by the percentage of gas accounted for. This rule, applied to each item, would give the addition to be made in order to arrive at the cost per 1000 cubic feet of gas sold.

Discussion having been invited, Mr. Ambrose dwelt on the necessity for a uniform basis, and referred to the misrepresentations and errors that had arisen on account of the absence of such basis. Mr. Egner thought that as coal was sold by the ton of 2000 lbs., it would be better to use this as a standard than the ton of 2240 lbs., as recommended. Mr. Shelton preferred to show the actual figures rather than to introduce any estimates based on the average results for a period of years. After some considerable discussion, it was agreed that blank forms, modelled on the report, should be issued to members for use next year.

A paper on "Gaseous Fuel" was read by Mr. E. G. Cowdery, of Milwaukee (Wis.). It embodied the results of some practical experiments made with a pan 9 inches in diameter and 5 inches deep, containing 10 lbs. of water. The sides were of tin, and the bottom of copper; and it was placed over a gas-stove having an equalized flame, spread over a diameter of 5 inches. The burner was so made that the air and the gas could be separately adjusted, and the supply of each was varied until the best result was obtained. Observing the quantity of gas consumed in raising the temperature of the water from 70° to 210°, it was found that a duty of 345 units was obtained per cubic foot of 16-candle coal gas, and 408 units from carburetted water gas of 25 to 30 candle power. Crude water gas, without air supply, yielded 153 units. But the burner was found to be unsuitable for this gas; and a special one was made, by which a duty of 183 units was obtained. A fuel gas said to be a combination of coal and water gas yielded 153 units per cubic foot. Last winter he tried an experiment in heating his offices with gas by the medium of a hot-water coil, and he compared the results with anthracite coal as used in his own house. He found that during 4½ winter months the consumption of gas was 4643 cubic feet per 1000 cubic feet of space warmed, and that of coal was 917 lbs. At this rate 10,000 cubic feet of gas were about equal in effect to a ton of coal. Pricing the coal at 26s. per ton, the value of the gas for heating would be 2s. 7d. per 1000 cubic feet. Applying this to the data above given, the value of crude water gas would be 1s. 3d. per 1000 cubic feet. From this it appeared, he said, that the successful fuel gas would be some sort of illuminating gas.

Mr. JAMES SOMERVILLE, of Indianapolis, followed with a paper on "Natural Gas Competition." He said natural gas was found about 20 miles from Indianapolis, and was brought to the city by three pipe-lines—one portion 16 inches, and the remainder 12 inches in diameter; the second 12 inches throughout; and the third, part 10 and part 8 inches. The pressure at the source was 300 lbs. per square inch; and it was estimated that these three lines would deliver 40 million cubic feet of gas per day. Its illuminating power was 9½ candles; its specific gravity, ·570; and it was practically free from impurities, though for the first year of its introduction it showed decided traces of sulphuretted hydrogen. The three companies set to work with great energy, as there was a large demand for the new and cheap fuel; and as they were not districted, but worked in competition (often with three mains down in one street), the effect on his own mains and services could be imagined. Before the natural-gas mains were brought into use, they were all carefully tested—the high-pressure mains to 80, and the low-pressure ones to 15 lbs. per square inch. The gas was usually burned at a pressure equal to about 13 inches of water. The great demand for fitter's work brought a number of gas-fitters into the city; and many tradesmen of other kinds became gas-fitters. But the companies met the danger of leakage by refusing to supply any house until the fittings had been tested by their own inspectors up to 10 lbs. per square inch. Some of the "fitters" would spend as long as two days in fitting up a house, and sometimes four or even five in stopping the leaks. After the first demand for natural gas had been met, the fitting trade began to slacken, and the fitters canvassed his consumers—thus getting about 500 customers. They would adopt the existing fittings, by putting on large burners using from 10 to 50 cubic feet of gas per hour. The gas for these burners was supplied by contract, without conditions, at 7½d. per month; and a heating or cooking stove, on similar terms, for 6s. 3d. per month. Attempts to carburet the natural gas had been made; but unsuccessfully. The Welsbach incandescent burner proved to be excellently adapted for the gas. He had not attempted to meet this competition in any way, beyond continuing to sell a pure 18-candle gas at the lowest possible price, and attending to the consumers cheerfully. He used the natural gas as a fuel on the works; andso he was able to send his coke away, and sell it at a fair price at a distance. The natural gas had brought increased business to the city; and he had shared in the benefit. Although for the present he had lost the whole of his day consumption, he was not only holding his own, but the demand for coal-gas was increasing, and the people were being thoroughly educated in the use of gas for all purposes. Therefore, when the supply of natural gas failed, as it probably would do before long, there would be a large demand for the manufactured article.

A paper on the subject of "Which is the Best Material for Street Mains—Wrought Iron, Cast Iron, or Steel?" was read by Mr. Eugene Printz, of Zanesville, Ohio. In commencing, he said that the answer to this question involved a great many considerations, such as soundness, first cost, and ability to resist the influences of the particular kind of soil in which the main is to be laid. Wrought iron was stronger, less liable to fracture by sudden jars, and could be laid quicker and cheaper, with fewer joints than cast iron; but it was more costly and less durable. In Ohio, a mile of 6-inch cast-iron pipe would cost nearly £400, or a similar length of 8-inch, £550; wrought-iron screw-jointed pipe, 6-inch, would cost £700, and 8-inch, £1200 per mile. But the wrought-iron pipe would only cost £25 or £31 respectively for laying and jointing, as compared with £80 or £105 where cast-iron piping was employed. This estimate assumed that screw joints, and standard weight wrought-iron pipe was used.

But if the light-weight wrought pipe with patent leaded joint, known as the "Converse" system, was used, the difference in its favour would be much increased. The saving in lead would be 1¼ tons per mile for 8-inch pipe, and nearly 1 ton for 6-inch, as compared with cast iron; and as the pipe is so much lighter with fewer joints, there would be a great saving in labour. There was strong evidence in favour of the claim that wrought is much sounder than cast iron; and it was easy to understand the reason why its use should have the effect of largely reducing the leakage. Cast-iron mains were, Mr. Printz said, practically indestructible by corrosion. He had in his district only one length of wrought main, which had been down for ten years, and was now in perfect condition. But it was a general experience that wrought service-pipes laid in wet ground were corroded through in time; in his experience they would last from 15 to 18 years. Cast-iron pipes laid in ground consisting largely of furnace ashes and cinders would be corroded in the course of a few years; but wrought iron, under such circumstances, would be much more rapidly acted on. This was mainly due to sulphur or sulphur acids in the cinders; and any ground that contained these would act prejudicially on the pipes in time. Sand, on the other hand, appeared to protect the pipes. Any fermentable matters caused corrosion of the pipes, due to the united action of carbonic acid and water He suggested the advisability of pausing before rejecting wrought in favour of cast pipe. On inquiring among his friends, he found that one had laid a 10-inch wrought-iron main in 1875, and an 18-inch light main of the same material in 1876. Both had been in use to the present time, and had cost nothing for repair. Another gentleman had laid wrought pipes, first coated with tar and dried in the sun, in 1858. In 1874, some of the pipe was removed to make way for larger, and was found to be quite sound and clean. It was re-tarred and laid in other streets. He now had upwards of eight miles of wrought-iron main in use; and he considered his low leakage account to be largely due to it. Mr. Shaffer, of the Standard Gaslight Company of New York, told him the wrought-iron gas-mains practically stopped all loss by leakage. Another gentleman, who had wrought-iron mains throughout, had a leakage of less than 1 per cent. In one instance coated wrought-iron pipe appeared to have lasted longer than cast-iron; and this suggested the advisability of coating cast pipes so as to fill the pores, and possibly reduce the leakage to that experienced with wrought pipe. He did not recommend the use of welded steel pipes, because it is difficult to get a good weld, and the steel is short in the grain and liable to fracture near the joints.

The latter part of the paper was devoted to a description of the "Converse" light wrought flush-jointed main. The ends of the pipes were, he said, connected by a short sleeve, that locked them together when rotated slightly. It was leaded and caulked. in the usual way, but no yarn was necessary. This joint was as sound as the pipe itself. The pipes were boiled in a mixture called "kalamein," which had the effect of incorporating into the body of the iron a non-corrosive metal alloy largely composed of tin; and the surface thus formed was not broken by blows or by bending. The sleeve or coupling was made of the best cast iron, boiled in paraffin and coated with asphalte. This system of piping was largely used for water, and for natural gas, and was highly spoken of as stronger and sounder than any other form of pipe. On account of the smooth surface on the interior of the pipe, the discharge was said to be fully 25 per cent. greater than ordinary cast pipe of the same size.

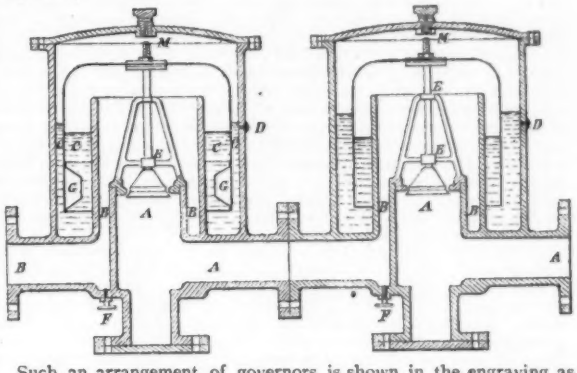
Mr. Tracy opened the discussion by stating that in his case cast-iron pipe would last any time, but wrought-iron was corroded in about four years; so he would not think of using it for mains. He produced a sample of 3-inch wrought main, and asked if Mr. Printz would recommend him to use wrought-iron after seeing it. He had lately commenced to paint service-pipes with two parts of tar and one part of naphtha as a preservative. Mr. Miller thought steel pipe was disposed of rather summarily in the paper. He said he was using it in preference to wrought-iron for service pipes. It was softer and cut nicer; so he could get better and sounder work with it. Mr. Forstall agreed with Mr. Miller, and said he used nothing but steel for pipes less than 2 inches in diameter. He had used wrought-iron stand-pipes in the retort-house for six years, and found them perfectly durable. Mr. J. B. Howard had found that wrought service pipes were practically indestructible in a black loamy soil. In sandy soil mixed with clay, there was some deterioration, which was more marked in pure sand. He lately tapped a 2-inch wrought-iron pipe that had been laid for upwards of 30 years, and found it to be perfectly sound; so that his experience showed that the durability of wrought pipe depended on the soil in which it was laid. Mr. Egner said he knew of an instance where a mile of wrought main had been laid, and was perfectly gas-tight. Mr. Schofield recommended the use of coated pipes. Mr. Lansden said he had tried wrought-iron stand-pipes; but they corroded so badly near the mouthpieces that he replaced them with cast-iron pipes.

The Largest Tank in the World.—According to the Allahabad *Pioneer*, the largest reservoir or artificial lake in the world is the great tank of Dhebar, 20 miles south-east of Udaipur, Rajpootana, which covers an area of 21 square miles. The masonry dam is 1000 feet long by 95 feet high, 50 feet wide at the base, and 15 feet at the top.

REGISTER OF PATENTS.

Gas-Governors.—Féron, A., of Lille, France. No. 11,622; July 20, 1889. [8d.]

This invention consists in combining two governors of the Clegg type so as to form a compound apparatus or double governor, whereby the patentee claims to be enabled to obtain the greatest amount of light with the least possible consumption of gas—a result which could not be attained with either of the governors comprising it if employed separately.



Such an arrangement of governors is shown in the engraving as enclosed in a cylindrical box of cast metal, having a cover to protect it from all external influences. In order to obviate the too-abrupt movements of the working parts that might ensue under the influence of sudden changes of pressure, the interior of the box is placed in communication with the exterior solely by means of a very small opening M formed in a metal plug screwed in the centre of the cover. This arrangement acts as an air-brake, that prevents all abrupt movements, and allows the working parts of the apparatus to descend or ascend only to the same extent as the air has time to enter or leave the space above the bell. The gas enters at A, and passes out at B. The annular vessel C contains a liquid (such as glycerine) which does not evaporate nor congeal at atmospheric temperatures. The plug D is so placed as to give to the liquid seal around the bell, when the latter is in its lowest position, a minimum height of 12 centimetres. The metal stem connecting the cone and the bell is guided by collars E cast in one with the valve-seat. F is a discharge plug for the water of condensation.

The action of the double governor is as follows: The bell of the first governor is loaded to such an extent that the gas shall only be able to begin to lift the bell when at the maximum day pressure—that is to say, 25 millimetres. As long as this limit is not reached, the bell remains in its lowest position, and the cone leaves the full area of passage open, so that the gas can pass freely with undiminished pressure into the second governor. The object of the first governor is to prevent all excess of the night pressure above the 25 millimetres, or maximum day pressure, from passing into the second governor. The bell of the second governor is provided with a float G, constructed to rise under a pressure of 5 millimetres, for instance; and it is capable of very easily maintaining this pressure constant, as the gas can only pass out of the first governor and enter the second one at a pressure equal to or less than 25 millimetres.

Meters for the Supply of a Predetermined Quantity of Gas.—Orme, D., of Oldham. No. 12,255; Aug. 2, 1889. [8d.]

This invention relates to meters for supplying a predetermined quantity of gas to the consumer by the setting of an index to the quantity required; the working of the meter and the supply of gas being arrested when the fixed quantity has been delivered.

Fig. 1.

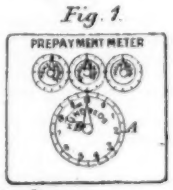


Fig. 5.

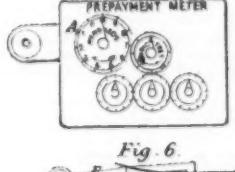


Fig. 2.

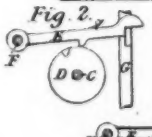


Fig. 3.

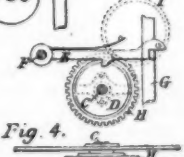


Fig. 4.

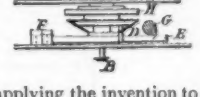


Fig. 6.

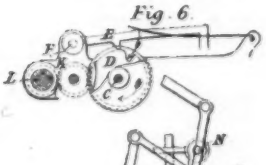
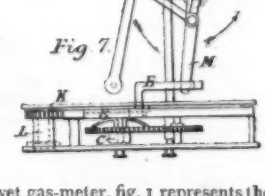


Fig. 7.



When applying the invention to a wet gas-meter, fig. 1 represents the dial employed. Figs. 2 and 3 illustrate the formation and action of the notch-wheel and drop-lever. Fig. 4 is a plan of a part of the indicator apparatus, and illustrates the formation of the friction clutch.

A is the additional index circle of the dial; and B is the additional index hand. In the example shown, the travel of the hand from 10 to 0

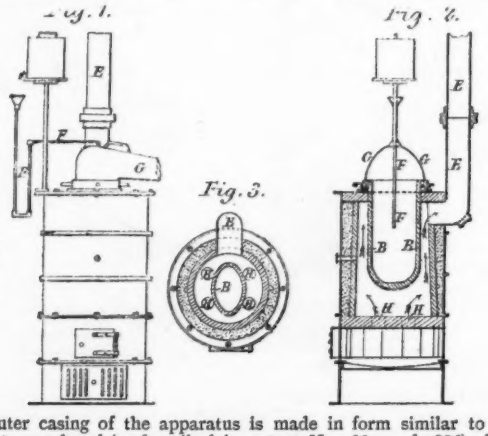
in the direction of the arrows would indicate a consumption of 1000 feet of gas; but may be less or more according to the arrangement of the gearing. The hand B is fixed upon an additional arbor C (seen in the other figures). The rear end of this arbor is adapted to be turned by a key, introduced through a hole in the casing. In practice, the end of the arbor is recessed to suit a special key carried by the gas inspector; so that it cannot be turned in any other way. Upon the arbor is fixed a wheel D, in which is a notch. A lever E is mounted upon a fulcrum at F; and is provided with a tooth or projection which rests upon the periphery of the notch-wheel D, whereby the lever is sustained in the position indicated in fig. 2. The upright shaft which connects the measuring drum with the indicator apparatus is represented by G in figs. 2, 3, and 4. Upon this shaft there is a projecting finger, which revolves clear of the end of the drop-lever, so long as it is sustained as in fig. 2. The wheel D is fixed upon the arbor in such a position in relation to the index-hand B as that just as the hand arrives at the end O of the scale, the notch permits the lever to drop into the position represented in fig. 3; so that the end of the lever is brought into the path of the revolving finger, which will then come into contact with the drop-lever before the finger can complete a revolution after the lever has dropped. It will be seen that the drop-lever, by thus preventing the rotation of the shaft G, will stop the further delivery of gas. Upon the arbor C is mounted a spur-wheel H, which (in the example) gears with the ordinary hundreds wheel of the indicator, as represented by the dotted circle I. The wheel H is a little larger than the wheel I—to allow for the space between the ends of the scale from 0 to 10; this space representing the portion of the periphery of the wheel D which is occupied by the notch. The spur-wheel H is formed with a friction disc having its periphery turned to a conical shape. A spring is attached to the wheel D; and the two ends of the spring are in contact with the conical edge of the disc shown. The wheel H, with its disc, is loosely mounted upon the arbor; being free to slide as well as to turn thereon. The parts can be forced towards the wheel D by turning a regulating nut, whereby the conical edge of the disc can be forced against the ends of the spring with sufficient pressure to ensure the parts D and H turning together during the ordinary working of the meter; the wheel H driving the wheel D by the frictional contact of the disc with the ends of the spring. When the inspector turns the arbor to set the index-hand and wheel D, the spring slips upon the disc—the wheel H remaining stationary.

The apparatus is intended to be used in this way: On the inspector calling to set the meter, the consumer may pay for a certain quantity of gas—say for 1000 feet. The inspector would insert his key and turn the arbor until the hand B would point to 10 on the scale. The wheel D would turn with the arbor and the detent tooth would rise out of the notch, and the drop-lever be raised so that the meter would be allowed to supply gas. As the hand B would turn in the direction of the arrow, it would indicate on the additional scale the amount of gas still standing to the credit of the consumer; so that by a glance at the dial, he would at any time see how much gas would be still due to him. On the hand arriving at the point O, the drop-lever would fall; and the supply of gas be thus arrested. As the arbor C is always turned in the same direction, the driving connection between the two wheels H and D might be effected by means of a rachet wheel and pawl.

Fig. 5 represents a dial suitable for a dry gas-meter. Figs. 6 and 7 illustrate the modifications made in the apparatus to suit the differences between the two descriptions of meter. In this instance, the additional arbor C is not directly acted upon by the key of the inspector, but is connected by gearing K with a shaft L, which is adapted to be turned with the aid of a key. This enables the keyhole to be brought to the front of the indicator; so as to be on the same side of the meter as the index scale. The drop-lever E is formed with a downward projection, which is intended to catch the arm M upon the ordinary vertical shaft N of the meter. So long as the drop-lever is held up, the arm clears the projection; but on the lever falling, the projection is brought into the way of the end of the arm, so that as it turns round, it comes into contact with the projection, and the further action of the meter is arrested.

Oil-Gas Apparatus.—Mansfield, E., of Salford. No. 14,715; Sept. 18, 1889. [6d.]

This invention relates to apparatus employed in the manufacture of gas from mineral or other oils or fats—more particularly that kind of apparatus known as "Mansfield's Oil-Gas Apparatus"—with the object of more effectually gasifying the oil or fat by the better utilization of the heated products of combustion. To accomplish this improvement,



the outer casing of the apparatus is made in form similar to that hitherto employed (as described in patent No. 6647, of 1886); but a greater amount of space is allowed for the products of combustion between the bottom of the retort and the cover of the furnace, and the central portion of the bottom of the retort is made thicker than its sides, for the purpose of retaining the high temperature at the point where the oil dropping has a cooling effect.

Fig. 1 is an elevation, and fig. 3 a plan of the apparatus. Fig. 2 shows a vertical central section of it.

Fitted in the outer casing of the apparatus is the retort B. The space for the heated gases to play about the retort is increased at C, in accordance with the present improvements; and a portion of the retort bottom is thickened where the oil is permitted to drop from the feed-pipe F, which is passed through the bonnet T. The direction of the heated gases, as they issue from the openings H in the fire-clay top of the furnace, is indicated by arrows; and after enveloping the retort and delivering thereto a certain portion of their heat, they proceed direct to the chimney E. The gas, as made in the retort, passes through the bonnet G to the hydraulic main, as usual.

Preventing the Deposit of Carbonaceous Matter in Gas Ascension-Pipes.—Stears, J., of Kingston-upon-Hull. No. 260; Jan. 7, 1890. [6d.]

The claim for this invention is for the application to the ascension-pipes of gas retort-stacks of a metal tube or jacket, the lower end of which may be closed, and perforations made in it, or it may be left altogether open. In the words of the patentee: "Owing to these arrangements, a continuous current of air will pass into the lower part of the metal tube or jacket, circulate around the ascension-pipe, and pass out of the open upper end of the metal tube or jacket. By this means a draught will be maintained around the ascension-pipe, which will keep it cool, protect it from the radiated heat of the gas retort-stack, and prevent the deposit of carbonaceous matter in it."

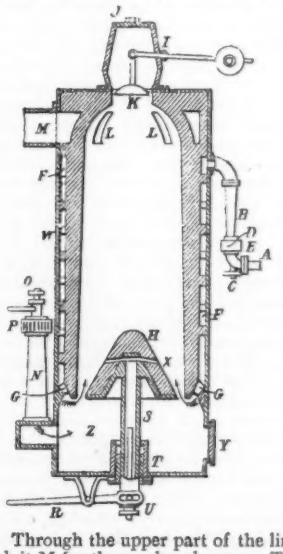
Gas and Oil Burner.—Allison, H. J.; communicated from F. R. Fennessy, of New York. No. 5322; April 8, 1890. [8d.]

This invention relates to that class of burners which have a central draft or air supply, and in which the flames from a gas-jet (or the gaseous products of combustion from a burning wick) are burned between the air-supplying perforated metal cylinders or chimneys concentric with the wick or jet. The object of the invention is to provide an apparatus by means of which a perfectly blue odourless flame of great heating power may be produced from coal oil or from ordinary illuminating gas for the purpose of heating, or for illumination when applied to a filamentary body of refractory earthy material placed in the flame so as to be rendered incandescent.

The invention consists (1) in the peculiar construction, proportions, and relations of the inner and outer perforated air cylinder or chimneys, whereby to secure the production of the odourless flame of high temperature; (2) in the manner of supporting the outer cylinder to allow access to the wick or burner for lighting; (3) in the manner of supporting the outer cylinder as well as the inner one, in order to cut off the conduction of heat from the cylinders to the oil chamber or wick tube; (4) in the construction (when applied to oil-burners) of a wick-raiser, whereby the wick may be evenly raised, and by devices not interfering with the general construction; and (5) in the provision of devices whereby a filamentary refractory body may be suspended over the flame or around the outer cylinder or chimney. There are also described certain other minor details of construction.

Gas-Producers.—Shedlock, J. J., and Denny, T., of Gresham House, London. No. 6584; April 29, 1890. [6d.]

This invention, relating to the construction of a gas-producer, is shown in the engraving to consist of a strong metal casing W, preferably of cylindrical form, lined nearly down to its bottom with refractory material; the lower part Z, which is not so lined, constituting an ash-pit to which access is obtained by opening a tightly-closed door Y. At the top of the casing is a suitable hopper I, with cover J, and valve K



for admitting fuel. Through the upper part of the lining are openings L, leading to a conduit M for the produced gases. The lining is preferably made as shown with an annular space between it and the casing, forming a series of circular channels F, which communicate with each other and with apertures G leading into the ash-pit Z. In the centre of the ash-pit is mounted, on a sliding-tube S, a conical hearth H. This tube passes through a stuffing-box T; and by means of an external level R, it and the hearth H may be raised or lowered for the purpose of breaking up clinker and dropping it and ash into the

ash-pit. At the bottom of the tube, there is another stuffing-box U, through which a pipe passes into the interior; and from the top of it, there are passages X through the conical sides of the hearth. B is an injector worked by steam supplied by the pipe A, and regulated by the valve C, drawing air through slots at D (regulated by a sliding casing E), and sending a current of mixed air through and steam down the channels F into the ash-pit at G. Another larger injector N with its valves O and P, for regulating the admission of steam and air, supplies the mixed current directly to the ash-pit Z.

The producer being charged with fuel kindled, the air and steam supplied from either or both injectors B and N, or from these worked alternately, finds its way from the ash-pit Z up the narrow annular space surrounding the hearth H, and through the fuel, producing gas, which is led away by the conduit M. Oil or liquid hydrocarbon may also be introduced through U, to issue from passages X, and mix with the fuel operated on. At first it is preferred to employ the injector N to send in a large quantity of air until the fuel becomes incandescent; and then the injector B may be used to send in a large proportion of steam, which, along with the air accompanying it, becomes heated in passing along the channels F before reaching the ash-pit. Afterwards the two injectors may be used alternately—the one to give abundance of air for the heating up of the fuel, and the other to give mostly steam to be decomposed by the hot fuel.

Purifying Illuminating or Heating Gases.—Andrews, W. C., of New York. Nos. 6800 and 6804; May 2, 1890. [8d. each.]

These two patents are to all intents and purposes identical, in so far as the means for carrying them into effect are concerned. The claims for the first-named invention are for: (1) A process of purifying gas, consisting in passing it upwardly through a body of solid purifying material which is alternately at rest and moving in a shower progressively downward during the passage of the gas; and (2) A process of purifying gas by passing it upwardly through successive layers of solid purifying material, and moving the layers of material in a shower progressively against the gas, and discharging the last layer as spent and re-supplying fresh material at will. The second patent claims: (1) The combination in a gas purifier of a lower gas-inlet and a gas-outlet; a series of horizontal sectional floors between the inlet and the outlet, each floor comprising separate sections of intermeshing grids; and mechanism for tilting the sections. (2) In a gas purifier, the combination with the casing of a lower gas-inlet and a gas-outlet, a series of horizontal sectional floors between the inlet and outlet, each floor comprising separate sections of intermeshing grids, supporting shafts for each section extending through the wall of the casing, and provided at their end with a crank, and horizontal rods connecting the free ends of the cranks in each floor.

Heretofore, in the purification of gas (says the patentee), it has either been led over solid purifying material lying quiescent in a compact body, or has been passed through it. In the former case the purifying material soon becomes coated superficially by products absolutely inert so far as purification is concerned, formed with the purifying material by substances chemically separated from the crude gas; and it soon becomes fouled superficially by deposits therefrom. In the latter case, the purifying material soon becomes coated and fouled internally by the same means; the gas making channels, and these channels becoming lined with the inert products and with the deposits. In either case perfect purification soon ceases; and in both cases the great bulk of the purifying material employed is kept from operation. The only remedy has been the stoppage of the current of gas, or the deflection of it to another purifier, so as to allow of a supply of new purifying material, or else to stir up the old so as to present new surfaces. The gas has also sometimes been passed through a shower of lime water; but wet purifiers are troublesome, and the gas has subsequently to be dried. The objects of the present inventions are to overcome these difficulties; to make the operation continuous; and thoroughly and directly to purify the gas.

Fig. 1 is a side elevation of apparatus for carrying this invention into effect, with a portion of the side broken away to show some of the interior parts. Fig. 2 is a plan of the apparatus, with the top removed. Fig. 3 is a perspective view of one of the details of construction.

A is the purifier, the bottom of which is formed with hoppers B closed by a valve. At each end of the casing (and within it) are rigidly attached rows of slats or arms C placed in tiers—the tiers being of suitable distance apart. Across the casing are rows of horizontal shafts D projecting from the side of the casing through stuffing-boxes, likewise placed in tiers and nearly in horizontal plane respectively with the rows of rigid arms C, and being each provided with a crank of (say) about a foot in length. Each shaft is provided with a series of transverse eyes or loops; and in these eyes are held series of moveable arms, slats, or cross-pieces D^1 of hard wood, metal, or other material, preferably enlarged at the centre, and there held by being driven into the eye. The shafts D are provided with cranks or other devices E; and to the cranks of each row of shafts are attached rods F, with levers F^1 for operating them. Of course, as one of the rods F is moved by its lever, all the shafts of that particular row will be rocked; and as the shafts are rocked, the moveable arms will be oscillated. Each row of shafts may be rocked separately, or their rods may be so connected as to rock two or more of them simultaneously.

When the moveable arms or cross-pieces D^1 are in horizontal position, they are in the same horizontal plane with the fixed arms C. The outer portions of the arms of the outer shafts form with the fixed arms, and the inner portions with the outer portions of the arms of the adjoining shafts (and so on mutually in each row), a grating or open platform to support the layer of purifying material. When the lever is moved, each of the shafts is rocked or shaken, and the several rows or slats are moved up and down in such manner that any material which may be placed upon them is agitated and passed through, down to the next course of slats below, and left comparatively level there. The levers being so moved that the cranks are in an upright position, the slats will again be in a level position; and the material upon each layer above can be worked in the same manner—the material being deposited upon the layer next below by a continual gradual movement. In like manner, the process is continued; the material being moved

Fig. 1.

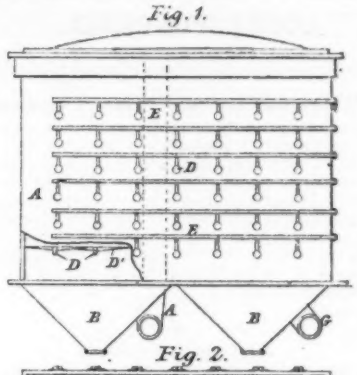


Fig. 2.

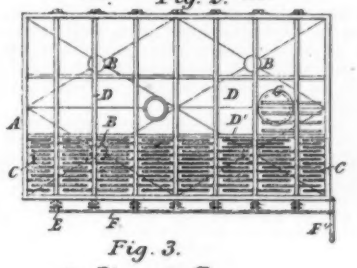
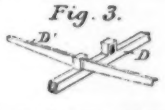


Fig. 3.



from the top towards the bottom, whence it may be drawn from the purifier, while new material may be constantly placed upon the top layer of slats, so that each layer shall contain its proper proportion of purifying material, or the whole shall be sifted down from layer to layer in continuous manner.

As ordinarily constructed, it is remarked, gas purifying boxes are only from 4 to 6 feet in depth, with stationary screens or trays for the purifying material; and to get rid of this when it is spent, it has to be removed separately from each tray. In the present case, the box may be of great depth—say of 24 feet. The screens or trays are moveable, and the purifying material has not to be removed separately from each tray, or scraped or dumped therefrom to a waste-box, but merely passes successively downward from one tray to another.

The gas inlet-pipe is at G; while the gas outlet-pipe is H. The gas outlet-pipe is, of course, beyond the first layer of purifying material. I is a removeable cover.

It is preferred to have the horizontal shafts in each row about $1\frac{1}{2}$ feet apart, and to have the moveable arms slightly less than 3 feet in length, with from 1 to $1\frac{1}{2}$ inch space between adjoining strips. By this construction, a great saving of labour is said to be effected, and a much larger quantity of gas than usual can be purified in proportion to the ground-space occupied, since not only is a great quantity of material immediately presented in active form, but as the tiers of purifying material may be in any number and be successively discharged, a purifier may be of great height, thus taking the place of many separate vessels.

APPLICATIONS FOR LETTERS PATENT.

10,976.—Davis, T. H. and A. H., "The purification of coal tar and rendering it a suitable paint or coating for iron and steel structures." July 15.

11,091.—Hutton, W. R., "Improvements in apparatus for making coke from coal, and obtaining tar and ammoniacal water and mixed gases therefrom." July 16.

11,101.—Pitkin, J., and Niblett, J. T., "Improvements in gas detecting and recording apparatus." July 16.

11,106.—Bott, J. E., Mortimore, W., and Lindley, F. H., "Improvements in gas producers." July 16.

11,188.—Christeiner, W., "Improvements in gas-engines." July 17.

11,224.—Tarda, P., "Improvements in meters for water or other liquids." July 18.

11,252.—Liardet, J. E., "Improvements in water motors." July 18.

11,346.—Curry, R., Mackie, G., Souter, T., and Hughes, G. B., "Improvements in the method of coupling or joining water, gas, steam, and every other kind of pipe." July 21.

11,385.—Cloudsley, J. L., "Improvements in gas-meter indices, whereby the quantity and corresponding value of gas consumed is shown and the reading simplified." July 21.

11,398.—Tully, W., and Corbett, J., "An improved gas-burner." July 21.

11,423.—Cadman, S., "An attachment to fit on a gas-burner to improve the light." July 22.

11,452.—Hall, J., "Improvements in the manufacture of coke or in the coking of coal." July 22.

11,495.—Heald, A., "Improvements in appliances for use with gas-lamps for producing light by incandescence." July 23.

11,537.—Cowan, W., "Improvements in prepayment gas-meters." July 28.

11,553.—Redfern, G. F., "Improvements in gas-regulators." A communication from J. Goebel. July 23.

11,615.—Moore, R. T., "Improvements in motive power engines operated by steam, water, gas, or other fluid pressure." July 24.

11,673.—Sturgeon, T., "Improvements in gas-governors." July 24.

11,739.—Clouet, G. P., "Improvements in dry regulators for gas-burners." July 26.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by correspondents.]

Mr. Gadd's Gas Institute Paper—A Correction.

SIR,—In my letter on the above subject in the current number of the JOURNAL (p. 253), I notice a somewhat serious misprint. The word "omitted" must be substituted for "admitted," in the twelfth line from the bottom of the first column. The clause will then read as follows: "But does Mr. Gadd really wish us to infer from this that those particular rollers have any appreciable force acting upon them when the other rollers are not *omitted?*" As the word "admitted" gives the very opposite meaning to the passage to that which I wish to convey, I should be greatly obliged if you will give this correction a place in your "Correspondence" columns.

Sutton, July 29, 1890. F. S. CRIPPS.

Mr. Cripps's Criticism.

SIR,—I also have little time for this matter; and indeed, should not "prolong the agony" in any way, but for the fact that Mr. Cripps unfortunately seems to prefer to misrepresent me. His last letter professes first to accept my explanation of an admitted error, and then seeks to discredit it. If Mr. Cripps does not believe my word, I prefer that he would openly say so.

For the rest, his objection is to the *distribution* of the strain upon the rollers. He says I represent "that the vertical force on one side only was distributed equally over all the eight points." Now anyone may see, by looking at my paper, that I there said "if we distribute equally through the points represented by the eight rails." I think any *ordinary* person would see that the word "if" was designedly inserted to avoid the necessity of working out complex details, which would vary somewhat according to the direction of the wind. I have never asserted that the division of resistance *is* equal on each rail; so that again we find the "man-of-straw" method resorted to. I am far from accusing Mr. Cripps of *deliberate* misrepresentation of my words; but I complain that he has not bestowed that careful impartiality one has a right to expect from an otherwise able man.

Again, he assumes that the point of view I have taken would throw all the weight on *one* rail. Is this quite candid? To get such a result, two things are necessary: (1) The structure must be an absolutely rigid one; and (2) the direction of force must be through a plane exactly coincident with the particular roller. Now the gasholder at Northwich is to some considerable degree an elastic structure; and it therefore cannot be considered in the way our friend now desires, merely for critical purposes. One would imagine Mr. Cripps to be more anxious to score, or to prove me tripping, than to arrive at the truth. This comes out very clearly, I fear, in the *plus* and *minus* paragraph. My signs doubtless would be in the wrong places—or some of them—were my object to show whether the metal was in tension or compression. I again repeat that Mr. Cripps *must* know that I was not using them for that purpose at all, or I should have used *double* signs, one on one side and one on the other. They were merely used as single signs, to show the forces at work, so as to enable (as I said in my paper) the reason of the four-fold strength to be demonstrated. It might just as reasonably be objected that I had been employing these signs for an algebraical equation.

It appears that Mr. Cripps, for some unaccountable reason, imagined that my paper was in some way aimed at his excellent work on "Gasholder Construction;" but I feel sure no person other than Mr. Cripps thought anything of the kind. Anyway, I must disclaim any such intention; and I can only hope he will withdraw himself from that "considerable number" among which he alone has placed himself.

Manchester, July 31, 1890. W. GADD, C.E., F.R.M.S.

Gasholder Construction.

SIR,—In the last number of the JOURNAL, Mr. Gadd questions the accuracy of my history "of the evolution of gasholders without guide-framing." I would ask Mr. Gadd if he did not consider Mr. Webber to have been the first to *suggest* the entire abolition of external guide-framing. Why he himself, in his paper before The Gas Institute, draws this very conclusion from Mr. Webber's original article.

Mr. Gadd quotes the following paragraph from Mr. Webber's article (see JOURNAL for March 29, 1887): "There is in the construction of gasholders a point, depending entirely upon their bulk, beyond which these structures are entirely independent of the external framing." He then comments upon it thus: "In other words, as it appears to me, if one only makes one's holder big enough—although it is a floating vessel—it will resist the wind pressure without any support other than flotation." Now, if Mr. Gadd draws this conclusion himself from Mr. Webber's original article, surely he should be the last to object to others doing the same thing. The impression the article gave me at the time was that Mr. Webber was almost prepared to rely upon the bottom rollers only working in the tank guides, providing that a perfectly rigid bottom curb and tight rollers were attainable. The correspondence which followed bears out this view. Mr. Gadd himself quotes the following paragraph from one of Mr. Livesey's letters (and which, it should be noted, appeared before Mr. Gadd "entered the field"):—"If some *practical* means could be devised whereby all the bottom rollers might be made to rise and fall equally, the holder would then, *to all intents and purposes*, have a solid foundation, and no columns or guide-framing of any kind would be necessary." This clearly shows that Mr. Livesey gleaned the same idea from the article referred to.

As a step towards the attainment of his suggested object, Mr. Webber proposed in the paper he read before The Gas Institute in 1887, to have two tiers of bottom rollers, only a few feet above one another, and running in tank guides carried up 6 feet above the tank—the guides to be backed by concrete piers at the top. Mr. Webber stated that the purpose of his paper was "to show that the ordinary lofty guide-framing of gasholders may be safely dispensed with, and its place supplied by a system of *guiding from the base*, which may be shortly described as a development by duplication of the bottom curb and rollers."

In the discussion following, Mr. Livesey asks: "What was the good of trying to dispense with framing altogether?" Mr. Webber's proposal was to *abolish entirely all columns, standards, girders, and ties*, which in the technical language of gas engineers and contractors, is known by the name of "guide-framing."

I think, therefore, it was only fair on my part to say that Mr. Webber's proposal was, "*to all intents and purposes*," a proposal for "doing away with guide-framing," although Mr. Gadd designates it a "loose expression." I can, therefore, only refer your readers back to my letter (see JOURNAL for July 22, 1890), which, in my opinion, gives a "true history of this phase of gasholder construction."

Sutton, Aug. 1, 1890. F. S. CRIPPS.

The Cost of Gas and Electricity at Bromley.

SIR,—My attention has been drawn to your reproduction of the greater portion of a letter which appeared in a Bromley paper written by a Mr. Wright (the reputed agent of Messrs. Laing, Wharton, and Down) in answer to my strictures upon his prior communications on the electric light question. I am somewhat surprised that a scientific paper should publish, without comment, such a compilation of deliberate inaccuracies; as the very groundwork of Mr. Wright's argument is so outrageous that it must be evident to the most uninformed.

Mr. Wright states that a 16-candle glow-lamp is equal to 2·16 gas-jets each consuming 5½ cubic feet per hour. But in what way does he attempt to prove this? Why, not in any way. He simply makes it as a statement; and on this he bases his argument. But I would venture to draw his attention to the fact that, were this statement true, the gas would be only capable of yielding 1·34 candles per cubic foot consumed, which means that by the standard test, the gas from which this marvellous result is obtained would be only 6·70-candle power. This is an absurdity, which could be only imagined by electricians.

That my figures should be so entirely confirmed by so well-known an authority as Mr. Denny Lane is sufficiently gratifying to me; and but for the fact of your publishing the letter without comment, I should have been content to have left it alone. However, for those who know not this district, I give the following particulars.

Bromley gas has an average illuminating power of 17 candles, which means that, with the standard Argand burner consuming 5 cubic feet per hour, 3·4 candles are obtained per cubic foot consumed; but, with a Sugg, Siemens, or Wenham regenerative lamp, as many as 12 candles per foot are obtainable. In my comparative statement, I assumed that good flat-flame burners were used (and they are cheap, and within the reach of all); and that an average of 3 candles per foot was obtained. As regards electricity, I gave the "watt" absorption and light obtained as being constant, and equal to that of a new lamp. Now had I made the average absorption to be equal to that stated to be correct by Mr. W. H. Preece—viz., 5·25 volt ampères per candle—the result would have worked out far worse for electricity, as this comparison will show:

By Electricity.

Fifty 16-candle glow-lamps giving a total illumination of 800 candles, and absorbing 5·25 "watts" per candle (the average given by Mr. W. H. Preece), or absorbing in all 4200 "watts" per hour, lighted for 1400 hours with the total absorption of 5880 Board of Trade units, which at 6d. per Board of Trade unit (the figure given by Mr. Wright).	£147 0 0
Seventy new glow-lamps at 4s. each (the average life of a lamp being taken at 1000 hours)	14 0 0
Meter hire	0 14 0
Converter hire	1 19 0
Main fuse hire	0 5 0
Total cost	£163 18 0

By Gas (with Ordinary Burners yielding 3 candles per foot).

Fifty gas lights giving a total illumination of 825 candles; each light consuming 5½ cubic feet per hour or in all 275 feet per hour, burning 1400 hours, having a gross consumption of 385,000 cubic feet at 3s. 3d. (the price charged in Bromley)	£62 11 3
Meter hire	0 16 0
Total cost	£63 7 3

By Gas (with Regenerative Burners yielding 12 candles per foot).

Seven regenerative gas-lamps giving a total illumination of 840 candles; each lamp consuming 10 cubic feet per hour, or in all 70 feet per hour, burning 1400 hours, the gross consumption being 98,000 cubic feet at 3s. 3d.	£15 18 6
Meter hire	0 16 0
	£16 14 6

This shows a direct gain in favour of gas, compared with electric lighting on the incandescent system, of 62 per cent. with ordinary burners, and 90 per cent. with regenerative burners.

As regards the arc lamp, it has been proved to be totally unsuitable for general use; and it can only be successfully adapted to large open spaces, railway stations, &c. However when an arc lamp is used, it gives an efficiency of from 1 to 1¾ candles per watt; and when compared with a regenerative gas-lamp yielding 12 candles per foot, the cost works out as follows:

20,000 "watts" or 20 Board of Trade units, yielding 1¾ candles per "watt," gives a total illumination of 35,000 candles at 6d. per Board of Trade unit	10s. 0d.
3000 cubic feet of gas yielding 12 candles per foot, giving a total illumination of 36,000 candles at 3s. 3d. per 1000	9s. 9d.

Thus showing that with the best arc lamp, the cost of arc lighting is 2½ per cent. more than gas; and, in addition to this, there is the cost of attention, carbon sticks, &c.

July 26, 1890. AUDI ALTERAM PARTEM.

The Leigh Local Board Gas-Works.—At the monthly meeting of the Leigh Local Board last Wednesday, the Clerk submitted the report of the working of the Gas Department during the year, and it was adopted. The balance profit—viz., £2088 2s. 7d.—was recommended to be disposed of as follows: £2000 to be transferred to the district fund account, and £88 2s. 7d. to the reserve fund.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

During the past week the following progress was made:—

Bill read the first time: Electric Lighting Provisional Orders (No. 11) Bill.

Bills read a second time and committed: Electric Lighting Provisional Orders Bills (Nos. 10 and 12); Tottenham Local Board Bill; Warrington Extension, Water, &c., Bill.

Bills reported: Electric Lighting Provisional Orders Bills (Nos. 10, 12, and 13); Tunbridge Wells Improvement Bill; Warrington Extension, Water, &c., Bill.

Bills read the third time and passed: Electric Lighting Provisional Orders (No. 13) Bill; Liverpool Corporation Bill; Sutton, Southcoates, and Drypool Gas Company (Electric Lighting) Bill.

HOUSE OF COMMONS.

Thursday, July 31.

THE QUALITY OF THE GRAND JUNCTION COMPANY'S WATER.

Mr. TATTON EGERTON asked the President of the Local Government Board whether his attention had been called to the quality of the water supplied by the Grand Junction Water Company, which on July 24 contained 33 per cent. more organic ammonia than the sample taken on July 23, 1889, and nearly double the amount of that contained in the Chelsea Company's water—viz., 16·4 as against 9·2 per 100,000 parts; also to the fact that the solids on heating showed a marked blackening, and the water was of a marked yellow colour; whether all this indicated bad filtration; and what penalty attached to supplying water of such an inferior character.

Mr. RITCHIE: My attention had not been called to the quality of the water of the Grand Junction Company on the date referred to, until my honourable friend gave notice of his question. I do not know where he gets his figures from. I may, however, say that, so far as regards the water supplied by this Company in the earlier part of the present month, the report of Dr. Frankland, by whom analyses of the water of the London Water Companies are made on behalf of my department, was to the effect that the improved quality which the Thames-derived waters have of late exhibited had been maintained. With regard to the supply on the date referred to, the result of the inquiries which I have caused to be made is that I find that on July 24, and for some days before and after that date, the Thames was swollen with rain, and the water was turbid and highly tinted with colouring matter, no doubt mainly derived from the abundant vegetation, cut grass, &c., spread about in the Thames valley. At the same time, there can be no question that the want of adequate filtration arrangements prevented the Company from effectually coping with the difficulties referred to. The attention of the Directors has been repeatedly called in the reports of the Water Examiner of the Metropolis to the necessity for increased filters; and I am glad to learn that, in view of the evidence which has been afforded of the need for a larger filtering area in order to deal with exceptional conditions of the river, the Company have intimated that the construction of additional filters will be undertaken without delay. Dr. Tidy, by whom the water of the Company is analyzed, states that no such thing as organic ammonia exists in the water, but is manufactured during the process of analysis. The special material to which the colouring matter of the water is due yields large quantities of the so-called organic ammonia, the quantitative estimation of which is no reliable test whatever of pollution. In justice to the Water Company, I think it right to state that I am informed by the Water Examiner that the filters as now existing are capable of dealing satisfactorily with the water when the river is in a normal condition; and the Directors appear to have been erroneously impressed by the fact that during the past 18 months the Company's water showed on several occasions, in Dr. Frankland's tables of the results of his chemical analyses, the smallest proportion of organic impurity of any of the Thames-deriving Companies. In fact, in its average proportion of organic elements during 1889, the Company appears to stand, with the Lambeth Company, second in degree of purity of the Companies drawing from the river. I see no ground, in communications I have received on the subject for the suggestion that the appearance of the water or the results of the analysis show sewage contamination.

Mr. TATTON EGERTON said that his authority for the statements incorporated in his question, was the Public Analyst for the Vestry of St. George's, Hanover Square.

During the past week the following progress was made:—

Bill read a second time and committed: Electric Lighting Provisional Orders Confirmation (No. 14) Bill.

Bills reported: Gas Orders Confirmation Bill; South Lincolnshire Fen Water Bill.

Bills read the third time and passed: Electric Lighting Provisional Orders (No. 11) Bill; Gas and Water Orders Confirmation Bill; Gas Orders Confirmation Bill; Plymouth Corporation Bill; Ystrad Gas and Water Bill.

HOUSE OF LORDS COMMITTEE.

(*Before Lord* BELPER, *Chairman; Earl* ROSSE, *Lord* NORTH, *Lord* HOUGHTON, *and Lord* ADDINGTON.)

GAS AND WATER ORDERS CONFIRMATION BILL—THE ALDERSHOT GAS AND WATER ORDER.

Petitions having been presented against the Gas and Water Orders Confirmation Bill so far as it related to the Aldershot Gas and Water Order, by the North Camp and Farnborough District Gas Company, Limited, the Woking Water and Gas Company, and the Aldershot Local Board of Health, it recently came for consideration before a Select Committee constituted as above. The principal point involved was as to the right of one Company to supply gas in bulk to a person or body within their own district for consumption in the area of another Company.

Mr. JEUNE, Q.C., and Mr. WORSLEY TAYLOR appeared on behalf of the promoters; Mr. LITTLER, Q.C., and Mr. DANCKWERTS for the North Camp and Farnborough Gas Company; and Messrs. WILKINS, BLYTH, and Co., as agents for the Aldershot Local Board. The Woking Water and Gas Company were not represented.

Mr. JEUNE having briefly opened the case on behalf of the promoters, the following evidence was called:—

Mr. *A. F. Wilson*, Assoc. M. Inst. C.E., deposed that he was Chairman of the Aldershot Gas and Water Company. He had considered the provisions of the Company's Order as regarded the additional capital, the mode of raising it, and the other matters referred to; and he regarded them as necessary alike in the interests of the Company and the public.

Cross-examined: Witness said that his Company's district was more thickly populated than that of the North Camp and Farnborough Company; but he did not know to what extent they could manufacture gas cheaper than the latter Company. It was not their intention to supply gas within the district of the North Camp Company.

Mr. LITTLER: Supposing a builder has an estate, a piece of which projects into your district, and on that he erects a gasholder, from which he sends a supply of gas into the district of the other Company, do you contend that you have a right to do this?

Witness: If the builder were a resident within the Aldershot district, and he asked us to supply gas to the holder, we should not have the right to refuse.

Although you knew all the gas that was put into that holder was going to be consumed in a different district. I do not want to discuss the right with you; but that is what you would do as a matter of fact?—We could not help ourselves.

We will see about helping yourself. That is what you propose to do with the Government?—Yes.

It would be a very great detriment to the other Company?—The detriment might arise if the consumption was given in the other district.

Although you and they have a district assigned to each by Parliament?—I do not see how it applies.

You have each your own parliamentary district?—Yes.

I suppose you would not like any other Company to do the same by you?—It is not a question of liking; it is a question of what we can do.

I am not going to discuss the question of law with a witness. Would you not think it was a fair thing that each Company should be prohibited?—My difficulty is to find how to prevent it.

If it could be prevented, you would think it right.—I think any customer within our district has a right to demand a supply.

Let us get past that. I am going to show that if it can be done, you would think it right that each Company should supply only within its own district.—I do not know that I have any right to form an opinion. I do not see that I can go beyond the supply to the consumer.

You can tell me what your opinion is. Would it not be manifestly fair that each Company should supply only within its own district?—Decidedly.

I think we could show you how it would act for us. You propose to supply gas in bulk to any body or person?—That is so.

Clause 38 of your Order I think says: "Supply any local board, company, or person, whether within or beyond the limits of supply."—We ought to exclude all those who have parliamentary boundaries.

But if you act by simply delivering gas into a holder on your side of the border, which is the same thing, what is the use of excluding those who have parliamentary limits?—My difficulty, as I say, is to prevent it.

Now, we want to prevent the Government (who are merely gas consumers) or any owner of an estate from taking gas from your district into ours, or carrying gas (which is less likely, as you are cheaper producers) from our district into yours. Should you say if that can be done, it would be right?—We have a contract with the Government by which we are bound to supply their holders; and we say it is difficult to carry out your contention. We cannot say to the Government: "You must not do this."

The Government cannot break the law?—You must first make the law, as there is none on this point at the present time.

It would be easy to say: "No gas shall be consumed beyond the district in which it is delivered."—I do not know why you should make such a law in respect of us, and not of other people.

You said just now that would be manifestly fair.—Certainly, it would be unfair for us to go out of our district into yours.

Re-examined: Witness had said his Company had a contract with the Government to deliver gas into their holders; and there the Company's responsibility ended. They could not interfere with the Government in the use they made of the gas. That was entirely their own business. He did not see how any limitation could be placed on the right of a consumer who took gas in that manner to use it in the best way for his own purposes.

Mr. JEUNE: Do you see any reason why the general law, if it is the general law, should be altered in this particular case; and thereby a restriction be placed on the consumer in using the gas when and how he likes when he has once bought it in bulk.

Witness: I do not perceive how we could prevent it. But the other Company could, because they have the power to oppose any individual or corporation opening the roads to lay mains for the consumption of gas. Any public body who opened roads or laid mains would be interfering with the public interest; and, therefore, I say that the law at present sufficiently protects and prevents such a thing.

You do not desire by this clause to have any power whatever for carrying mains into the neighbouring district, or of opening the ground in that district?—None whatever.

The gasholder in which you supply the gas is the property of the Government, and under their management?—Yes.

Where they lay their pipes, or carry the gas, is entirely their doing, and in no sense yours?—We have no power over it.

This was the only evidence given on behalf of the promoters.

Mr. *H. E. Jones*, M. Inst. C.E., the Engineer of the Commercial Gas Company, was then examined in support of the petition of the

North Camp and Farnborough Gas Company. He stated that he was the Consulting Engineer of the Company, which was formed to meet the requirements of the Farnborough district. They were empowered to supply a very large area, which at the time they started was rapidly developing; but this did not continue. In consequence, the Company had had as much as they could do to satisfactorily carry on their existence; and any inroad into their area would be very injurious to them. They had spent a large amount of capital; and if the Aldershot Company were permitted to take away any of the lighting properly falling within their limits, they would do a lasting injury to the shareholders and consumers. Every consumer was interested in causing the whole of the consumption within the district to be retained in the hands of the local company seeing that it was only by the consumption of gas increasing that a reduction in price could be brought about.

Mr. LITTLER: There is this proviso in clause 38—"That the promoters may supply any local board, company, or person, whether within or beyond the limits of supply, with gas or water, or either, in bulk." It is common enough, is it not, to supply water in bulk?

Witness: There are one or two precedents I am aware of for supplying water in bulk.

Is there any precedent that you are aware of, except Romford, of supplying gas in bulk?—I believe there is no precedent for this clause; and the only precedent in the past four years is the case of Romford, where there is no other gas company within seven miles. I know the Romford district exceedingly well; and there is no other gas undertaking within seven miles. In that case there is Ind and Coope's brewery, which would require a supply of gas in bulk.

Therefore there was a special reason for putting the provision in that Order?—Yes.

And there is no company whom it could hurt?—No.

Examination continued: In 1886 there were six Gas Provisional Orders; and not one of them contained a "bulk clause." They were the Chertsey, Loughborough, Melksham, Menai Bridge, Pocklington, and Lyndhurst Orders. In 1887 there were the Portsea, Penmaenmaur, Musselburgh, Bedford, and Long Melford Orders. The Long Melford Company obtained power to furnish gas in bulk to the Company supplying the town of Sudbury, which is close by. The Long Melford Gas-Works were on one side of the river, and the Sudbury Gas-Works were a long way off. This supply was by agreement. In 1888, there were three Orders; and in one, the Goring and Streatley Gas and Water Company were sanctioned to supply water only in bulk. In 1889 there were six Orders—St. Ives, Otley, Buckley, Market Rasen, Melton Mowbray, and Warminster—which did not get this power; but the Romford Company did. He had carefully searched through the Orders, and with this exception and that of Sudbury, there was not any case in which this power to supply in bulk had been granted. If this were permitted, it would enable a Company possessing the power to undercut an adjacent Company; and it would be against what was understood now to be the law upon the subject—it would be against the practice of Parliament. There would be no difficulty in ascertaining where the gas supplied in bulk was destined for. He believed there was hardly a place in the whole country (with the exception of the case of the Partick, Hillhead, and Maryhill Gas Company and the Glasgow Gas Commissioners) where companies were supplying gas in competition. The Partick and Glasgow contest in the present session almost illustrated the practice of Parliament* and the very point which arose in the Order under consideration. The Partick Company started as a limited concern for competitive purposes; and it was now supplying as much as 200 million cubic feet of gas per annum; and yet Parliament had refused to give it certain powers in this session. The Chairman of the Committee evidently showed sympathy with the position of a Company which had met the public test, and had grown in figures, in fourteen years, ten times as large as those which the Glasgow Corporation had acquired in the same period; and he put pressure, as far as he could, upon the parties to come to some agreement. When the Glasgow Corporation refused to purchase, or to make any further advance, the Committee (the witness thought almost unfortunately) threw out the Bill. There was good reason in the present case why the special power to supply the bulk should not be given, or why any evasion of the ordinary rule should be permitted. The motive of the clause was, of course, to get the supply of the North Camp. If it were allowed, any owner of an estate might erect a holder across the border, if he had a piece of land there, and so evade the law, and pass gas into the North Camp Company's district. He was well acquainted with the facts of the districting case between the South Metropolitan and The Gaslight and Coke Company; and the same facts arose in connection with the Aldershot and the North Camp Gas Companies.

Mr. LITTLER: As a gas engineer, where do you say is the place of consumption, at the burner or at the holder?

Witness: Clearly at the burner; and the House of Lords' decision amounts to this—that the supply must be taken to continue to the point of burning the gas.

Therefore, in point of fact, if the Aldershot Company supply gas for the purpose of being burned in the North Camp district, they are supplying it for consumption out of their district?—Yes; *ultra vires.*

I believe for some years the North Camp Company did supply gas by contract to the Government, did they not?—Yes; but that was not as makers of gas from their own works, but as strangers working gas-works which belonged to the Government, and which are in the North Camp within the Government area. They did that very effectively, and very cheaply.

The CHAIRMAN: Have the Government gas-works now?

Mr. JEUNE: No; they do not now manufacture gas at them. They have a holder which the Aldershot Company fill with gas.

Mr. JEUNE: Let us see what it is you complain of, or what it is you seek to prevent. As I understand it, what you seek is to prevent us filling the Government holder with gas, and their taking the gas where they please?

Witness: We wish to prevent you manufacturing the gas in one place, with your own works, plant, and capital, then sending it into the holder, and putting all the pressure on the gas which is necessary to carry it to the burner.

We fill the gasholder, and leave the Government to put what pressure they please to carry the gas where they choose. Do you object to that?—Yes, I do, because there is no pressure from the gasholder. You put the pressure into the gasholder before it can take this quantity of gas.

That is to say, we fill the holder with gas, and then the pressure supplied by the holder itself drives the gas out?—You supply it at an abnormal pressure; and you practically in this way supply the pressure that takes the gas off.

It is a matter of what the Government choose to do, is it not, in the way of driving the gas out of the holder, and taking the gas where they please?—The position of the gasholder does not affect the case in the least. It is equally illegal whether the Government or the Company lay the pipes across the boundary.

What you suggest is that the Government or a private owner should be prevented from laying gas-pipes from their own gasholder to any place they please?—Quite so. That is the law at the present time.

Can you give me any precedent whatever, where a gas company has been forbidden to supply gas in the way in which we propose, and leave it to the consumer to take it where he pleases from the holder?—Yes, I can. That has been forbidden in the case between The Gaslight and Coke Company and the South Metropolitan Company. The Canterbury and Gravesend Companies this session came to Parliament with a clause like yours in their Bills; and Lord Morley struck the clause out.

You are seeking to put a clause into this Bill the effect of which is to prohibit our supplying gas to the Government gasholder. I ask you whether you can mention a single case in which Parliament has sanctioned such a prohibition?—No, I cannot; nor can I remember Parliament sanctioning such an arrangement.

Are you aware that in three of the Provisional Orders of this very session, there are exactly similar provisions word for word, approved by the Board of Trade?—I am not aware of it. I have looked through all the Orders that have passed the House the last four years.

Mr. JEUNE: I am suggesting three in this very session. The Tunbridge Gas Order, clause 32 ——.

The CHAIRMAN: Are the words like the clause which is proposed in the Aldershot Order?

Mr. JEUNE: The three clauses in the Provisional Orders are exactly the same as the clause stood in our Order without the concession which we have made. There is the Tunbridge Order, clause 32, the Yorktown and Blackwater Order, clause 24, and the Ware Order.

Witness: I do not know those cases; and I hope they will not be confirmed.

By the CHAIRMAN: At present there was no gas burnt at the North Camp; they had other means of lighting. Asked whether, supposing the Government wanted gas in the North Camp and erected a holder there, such as they had in the South Camp, and the North Camp Company were to supply that holder with gas, was there anything in their Act which would prevent the Government sending the gas across the boundary into the South Camp, witness said he thought there was. He believed the Company could easily be stopped by injunction—it would be *ultra vires.* There was nothing in the Company's Act that would warrant it; and it would be against the Act as it stood.

Mr. LITTLER having addressed the Committee, on behalf of the North Camp and Farnborough Company, against clause 38,

Mr. JEUNE was heard in reply.

Parties were then directed to withdraw. On being re-admitted,

The CHAIRMAN said: I had better explain the view the Committee take about this clause. They do not wish to express any opinion on what is the bearing of the general law, nor to adopt any words which might seem to affect it. One difficulty of altering the clause is that gas and water are both mixed up in it. It will be necessary, after the Committee have given their decision, to have a clause dealing with each separately. The powers as to water in clause 38 will stand. This, I understand, is not objected to. With respect to supplying gas in bulk within the district, they do not think these powers are necessary, and that probably the Company have these powers without any special clause conferring them. With respect to any power for supplying gas in bulk by agreement outside the district, this should be with the previous consent of the North Camp and Farnborough Gas Company, in the words of the suggested clause of the previous agreement with that Company. We ask that the clause be withdrawn.

Mr. JEUNE: Only as far as the North Camp and Farnborough district is concerned.

The CHAIRMAN: We do not know that there are any other districts opposing. As far as other districts are concerned, they will be able to give you powers to supply on agreement. Our difficulty is that the water and gas are mixed up together. They will probably be more conveniently put in two clauses; and treat the present clause as the one relating to water.

After an adjournment,

Mr. JEUNE brought up a clause in which all reference to gas was omitted, and a further clause to the effect that the Aldershot Company might, upon agreed terms, supply any body or board beyond the limits of supply with gas in bulk, such supply not to interfere with the supply within the limits, and that gas was not to be supplied in bulk within the limits of the North Camp and Farnborough Company, without their previous consent.

Mr. LITTLER suggested that the words "under the powers of this Order" and "in bulk" should be struck out.

The CHAIRMAN remarked that the Committee did not intend to give by their decision any further powers than were given under the General Act.

Mr. JEUNE observed that the words "in bulk" were intended to make it appear that the restriction only applied to the clause in question.

Mr. LITTLER suggested that the Aldershot Company should not exercise the powers granted by this section within their district, except with the consent of the other parties.

Mr. JEUNE accepted this amendment.

The preamble and clauses of the Order were then read and agreed to with amendments; and the Chairman was directed to report the Bill as amended to the House.

* See JOURNAL, Vol. LV., p. 984.

HOUSE OF COMMONS COMMITTEE.

(*Before Sir* GEORGE TREVELYAN, *Chairman*; *Mr.* BARTLEY, *Mr.* CAUSTON, *Mr.* RICHARD CHAMBERLAIN, *Baron* DIMSDALE, *Mr.* TATTON EGERTON, *and Mr.* LEVESON GOWER.)

METROPOLIS MANAGEMENT AND BUILDINGS ACTS AMENDMENT BILL.—STEAM-ROLLERS AND GAS AND WATER MAINS.

In the JOURNAL for the 22nd ult. an abstract report was given of the evidence brought before this Committee in support of the two clauses of the above Bill (Nos. 6 and 8) affecting the Metropolitan Gas and Water Companies; and to-day we publish a summary of the evidence given in opposition on behalf of the Gas Companies.

Mr. H. L. CRIPPS appeared for the promoters; Mr. POPE, Q.C., Mr. LITTLER, Q.C., and Mr. DANCKWERTS for the Gas Companies.

Mr. *G. C. Trewby*, the Chief Engineer of The Gaslight and Coke Company, was the first witness. He stated that he had had experience in the manufacture and distribution of gas for the past 35 years. His Company was established in 1810. The capital was £12,000,000; and the number of men employed was about 10,000. The total area served by them was 60 square miles; the mileage of mains being 1850. The mains varied in size from 3 inches to 48 inches in diameter. Pipes of the latter size were laid at a depth of 2 feet; but in some places it was impossible to get to this depth. As to the difficulties of laying mains at a uniform depth, there were various obstructions—the sewers, water-mains, vaults, cellars, and now the electric light culverts. It would be impossible to ensure a minimum depth of 24 inches. For instance, opposite the Aquarium, over the Metropolitan Railway, there was only about 7 inches of metal above the gas-main. The water companies' pipes, he believed, were laid from 24 to 30 inches from the surface of the roadway. Under the Metropolis Gas Act, the Company were compelled, whenever a gas-main crossed a water-pipe, to go above it; and it was therefore necessary that they should keep their system at as high a level as possible, consistent with due safety. It was impossible for the mains to be laid perfectly level, as they had to allow for dipping and certain obstructions; and had to put in syphons to collect the condensation from the gas. The multiplication of these syphons also introduced other inconveniences—for instance, they had to communicate with the surface of the road by means of a pipe, for the purpose of driving out the condensation. It was, of course, necessary that they should keep the mains on the same level as far as possible, with a view to fulfilling the parliamentary obligation with regard to pressure; and therefore the less obstruction put in the way of the mains the better. If it were practicable, he would have no objection to mains being laid at a uniform depth of 24 inches. They were now obliged to protect themselves against the normal traffic and the ordinary means of repair. In addition to this, it was essential that they should have the mains so placed and so laid as to obtain a ready access to them. Whatever operations the Company were engaged upon in the streets, they had to be done to the satisfaction of the authorities, and under their supervision. With regard to totally new lines of mains, they could not, under the Metropolis Management Act, lay them without the consent of the Vestry. If the Vestry thought it particularly dangerous that mains should be laid, they would prohibit it entirely, subject to an appeal to the Board of Trade. Such cases had occurred in connection with the Kensington and the Hackney Board of Works; and in these, the question of the steam-roller was raised. Of course, the deeper the mains had to be laid, the longer the free use of the road would be interfered with. More attention was now paid than formerly to the casting of pipes; and they were made stronger. Having regard to the way in which the Metropolis was at present occupied by pipes, the new pipes laid after the passing of the Bill under consideration would be very much mixed up with the existing ones; so that it was not of very much use to prescribe a great depth like 24 inches, when the other pipes were at a less depth already.

Cross-examined: There were a large number of places where the Company's gas-mains had to cross water-mains; and supposing the latter were not at a sufficient depth to enable them to place their mains 24 inches below the surface, of course it could not be done. To make their mains cross the water-mains would be a question of expense; and the gas-pipe going up and down would not carry the same volume of gas along. Of course, the existing mains went up and down to a certain extent; but what was now proposed would make the up-and-down arrangement much more considerable. As to whether it would be practicable to make the gas-mains stronger, he said it would; but the objection was the obstruction that would be put into the pipes by having syphons at frequent intervals. It would not do to make the pipes of wrought iron; the corrosion would be too great.

Re-examined: As to the life of a cast-iron pipe, witness had no doubt that, if properly coated, it would last for 50 years. A wrought-iron pipe would not last more than four or five years.

By the COMMITTEE: Witness said his Company did not now lay service-pipes in a trough of asphalte, because of the expense; they simply coated them with a composition. The deposition of naphthalene was to a large extent a question of temperature; and if the pipes were laid lower, it might be lessened. But condensation was what they had to provide for; it was only in certain cases they were troubled with naphthalene.

Mr. *G. F. L. Foulger*, the Chief Inspector of The Gaslight and Coke Company, deposed that he had charge of the Company's distributing system. He considered that a depth of 18 inches would protect the mains from all ordinary traffic. He agreed with some parts of Mr. Trewby's evidence; but disagreed with him in regard to the duration of the service-pipes. Their average life would be about 15 years; but, of course, it would be subject to the nature of the ground in which they were laid. If a cast-iron main was laid in good soil, it would last almost indefinitely. He had seen some which had been in the ground for 50 years; and they showed no signs of depreciation. After interfering with the surface of the road, the Gas Company had to keep it in repair for twelve months. They never, if they could possibly avoid it, laid a main on ground that had been disturbed. If a pipe was well laid and bedded throughout, it was practically safe against fracture. As to the depths at which the Company placed their pipes, they varied very much, in consequence of the obstructions in the streets. A few weeks ago they wished to lay a main near Finsbury Park; but they could not get to any depth on account of the number of water-mains coming from the reservoirs of the New River Company. In fact, they had to make an arrangement with the County Council to carry the main inside the park. In Bridge Street, Westminster, the greatest depth they could go to over an arch was 1 ft. 4 in.; and in Cannon Street, 1 ft. 9 in. There were a great many more examples of this kind in the district. He had with him a list of breakages by steam-rollers; the depths at which the fractured pipes were laid being as follows: 1 ft. 1 in., 1 ft. 3 in., 2 ft. 4 in., 2 ft. 1 in., 3 ft., 2 ft. 9 in., 2 ft. 2½ in., 2 ft. 11 in., and so on. In this particular list there were 107 fractures, which occurred between the years 1873 and 1876. There were 61 in the St. George's parish, which were directly attributable to steam-rollers. They were mostly 4, 3, and 2 inch mains. There were none in the list larger than 4 inches. The cost of repairs was comparatively small to the injury that might be produced by the fracture. Gas escaping from a broken main sometimes travelled a long way, and did considerable damage. He knew an instance in the Beckton Road where gas passed along a sewer 200 yards. It escaped from a drawn joint in one of the large high-pressure mains. The gas, instead of coming to the surface, found its way downwards, in consequence of the road being frozen, and ignited at a sink, where a woman was washing, with a candle close by, and this caused an explosion in the sewer. The question of danger to the public by these fractures was of primary consideration; the expense of repairing them was of secondary importance. Having regard to the multiplication of electric light mains in the Metropolis, the risk of injury had been considerably augmented.

Cross-examined: Witness said he had not himself seen the fractures mentioned in the list he had referred to. The information was taken from the returns of the workmen.

By the COMMITTEE: He believed that the edges of a trench made for gas-mains would take the weight of the steam-roller used over it. But he had noticed, with very heavy rollers, that a sort of wave was formed in front of the machine. It must also be remembered that, when a steam-roller was being employed, a water-cart played in front of it, to render the whole ground equally soft.

Mr. *H. E. Jones*, the Engineer of the Commercial Gas Company, stated that the Gas Companies would be prevented, by the numerous underground works, from laying their pipes at a uniform depth of 24 inches. He knew of many instances in which it was impossible to obtain that depth; and said it was surprising how thickly the subsoil of the more populous parts of London was occupied. He was acquainted with a crossing in an important street which had on one occasion to be kept open for ten days while the engineers of the various authorities interested in the spot were conferring with regard to the way certain obstructions could be got over, and special castings were being made to provide for the interweaving of the different systems. The depth at which the Gas Companies could lay their mains was determined by the existing works. Sufficient protection from climatic interference could be obtained at a less depth than had been suggested—15 or 18 inches would be ample. With respect to ordinary traffic, he had known a 4-inch pipe within 8 inches of the surface to have been in use for 25 years, until it was broken by a steam-roller passing over it. Large castings, loads of coke, and material from the gas-works were constantly conveyed over this pipe. Having alluded to the dangers which arose from escaping gas, witness said that he was concerned in the action some years ago connected with an explosion of gas in Buckingham Street; and in that case it was proved that gas would travel horizontally for a considerable distance. With regard to the suggestion that, if the pipes were laid at a greater depth, the Gas Companies would be compensated by the reason that they would have less deposition of naphthalene, witness did not think there was anything in the argument. As a matter of fact, there appeared to be a little misapprehension. The syphons did not receive naphthalene, but only the water vapour from the gas. Naphthalene was present in pipes at quite ordinary temperatures—say, of 50° or 60°; and he did not think the difference in the depth of the main had anything to do with the question. He had found most naphthalene in pipes that were very much used, and carried a great bulk of gas, even when they went to a great depth. The amount of naphthalene seemed to bear relation rather to the volume of the gas than to the position of the pipe. As to the injuries to the Gas Companies' mains, a steam-roller fracture was, practically speaking, unmistakable. No conceivable condition of things with ordinary traffic could bring to bear such a burden and strain upon the pipes as a 10-ton steam-roller imposed. He had never seen any case of fracture yet where there was not evidence of the subsoil itself having been in fault. The obvious aim of the present Bill was to legalize steam-rollers; and he considered that the difference between 18 and 20 inches would have a very slight effect in rendering the action of the roller safer. The Wandsworth Gas Company, of which he was a Director, had about 50 miles of mains in their district; the Commercial Company had 200 miles; and the South Metropolitan Company, 600 miles. With such an extensive mileage of mains to look after, it was impossible to pay very careful attention to the steam-rollers, of whose use they received no notice. Upon the whole, the subsoil of the roads in the Metropolis was not, witness maintained, consolidated enough to withstand the pressure of these abnormal machines. He did not think there was any need for clause 8 in the Bill; but the Companies would not object to the rollers if the Vestries would only take from them the risk they brought by their use. A lighter roller made a much better and more lasting road than a heavy one. If it was simply a question of getting the road repaired speedily, he imagined that they would get over this by increasing the number of rollers.

In cross-examination, witness said that, with regard to the Vestries taking care that the roads were not excavated, and the good material taken away, he quite agreed with the advantage of their having this power. Asked if he did not think that, if some benefit was to be gained out of one part of the Bill, the Gas Companies need not be so very anxious about making a small concession under another part, he said it was not merely a question with the Companies of the breakage

of their main-pipes, but it was the terrible consequences that might arise from a comparatively small leakage of gas in the neighbourhood of dwelling-houses.

Mr. *G. Wallis*, Surveyor to the Board of Works of St. Giles, gave evidence bearing upon the construction of roads in the Metropolis. He stated that in 1875 he used a 15-ton roller; but it crushed the stones to such an extent that he adopted instead a 4-ton horse-roller, and continued to use this for several years. He always employed now a 6-ton machine. The time occupied by this roller in smoothing a road, as compared with the 15-ton roller, was 20 per cent. longer.

Mr. *W. B. Scott*, the Chief Surveyor to the Vestry of St. Pancras, also stated that he preferred a 6-ton roller for consolidating the roads under his charge.

Mr. *W. Fagan*, an Inspector of The Gaslight and Coke Company, gave the names of several streets where he could not lay pipes at a depth of 2 feet in the district under his care—extending from Temple Bar nearly to Hammersmith Bridge. He had no reason to suppose that his district varied from others in the frequency of this difficulty, to get to a depth of 24 inches.

Sir *Frederick Bramwell*, Bart., F.R.S., said he did not think clause 8 was a practicable one. It appeared to him that the Committee were asked to take upon themselves the determination of a 10-ton weight for road-rollers without there being any sufficient grounds for it; and with respect to the depth proposed, he did not think it gave the immunity that was supposed, because the pipe was not broken, according to his view, by the incumbent weight coming through the earth upon a pipe laid in a solid bed, but was fractured when it was acting as a girder carried at the two ends.

Dr. *J. Hopkinson* was next examined. He pointed out that a steam-roller was always used when a road was in its very worst condition for bearing a load. The road was broken up, and the surface was very rough; and owing to its broken condition, there was a large amount of vibration caused by the roller passing over the road, and dropping from one stone to another. None of these conditions existed in the case of ordinary traffic.

Mr. POPE, in addressing the Committee for the South Metropolitan Gas Company and the London and North-Western Railway Company, said that clause 8 was an objectionable form of legislation, which Parliament ought not to enter upon. It was unwise in its motive; it was unnecessary for any legitimate purpose; and it would practically be unworkable. The clause was simply for the relief of local authorities, and to discharge them from the liability under which they were placed at present by the common law of the land. The Gas Companies occupied the streets by authority of an Act of Parliament; and if otherwise unrestricted, they were entitled to use the statutory powers given them, so long as they did it without negligence and in the best manner possible. It was the ultimate consequence which an accident to their mains might bring upon the Companies, which they objected should be taken from other shoulders and practically placed upon their own. If they could show that the cause of the escape was the fracture of a pipe by reason of a steam-roller, they thought the primary liability would be a remedy over against the local authority using that steam-roller; and it was the relief of the Vestry from the liability over to the Companies which was really the subject-matter of the clause. This was unfair, and wrong in principle. Since the decision of the Courts in the steam-roller actions, there had been no difficulty, and no friction between the Company and the Vestries. This was the result of leaving the responsibility of both parties as it existed by the common law; and, in his opinion, it would be wise if the Committee left things as they were.

Mr. CRIPPS, in his reply, said it was remarkable that Mr. Livesey was not called before the Committee to resist this proposed legislation; and he proceeded to point out that it was to no small extent at the instance of the South Metropolitan Company that this legislation was undertaken, because he considered that the propositions which were involved in clauses 6 and 8 really formed part of the same subject-matter. The object of the latter clause was not to take away from one and place upon another an existing legal liability, but to define the limits within which the respective liability was to exist.

The Committee having consulted,

The CHAIRMAN announced that they considered the preamble of the Bill proved; and it would be passed, with the exception of clause 8, which would be struck out.

The other clauses were then gone through; one or two small amendments being made in clause 6.

Extensions at the Tipton Gas-Works.—At the last meeting of the Tipton Local Board, the Gas Committee recommended that the tender of Mr. J. Evans, of Abbotsford, London, for the erection of a gasholder tank be accepted. The amount of the tender was £2187; the estimated cost being £3000. Sanction to borrow £10,000 for improvements at the gas-works has been obtained; and it was decided to take steps at once to raise the money.

Stoke-upon-Trent Corporation Gas Supply.—The accounts of the Gas Committee of the Stoke-upon-Trent Corporation for the financial year ending the 31st of March last, prepared by the Secretary (Mr. E. Roberts), have just reached us. They show that the revenue from public and private lighting amounted to £12,101; and residuals produced £2436. The total receipts were £15,094; and the expenditure was £9279—leaving a balance of £5815 to go to the profit and loss account. The total on the revenue side of the account at the close of the year was £13,610. The expenditure comprised interest on loans, £2473; portion of principal repaid, £617; amounts paid to Corporation, £3500; balance (including £2725, the year's net profits), £7020, which is carried forward. The quantity of gas made and sold was greater in the past than in the preceding year; and the Manager (Mr. Herman Taplay, Assoc. M. Inst. C.E.), has to be credited with effecting a slight reduction in the gas unaccounted for. At the last monthly meeting of the Town Council, a resolution was passed, on the motion of Mr. C. S. Jones, to form a Committee, consisting of six members, to manage all matters connected with the gas-works, and to report their work each month to the whole Committee.

LEGAL INTELLIGENCE.

COURT OF SESSION—BILL CHAMBER.

Monday, July 14.

(*Before Lord* KINCAIRNEY.)

Partick, Hillhead, and Maryhill Gas Company, Limited, v. Magistrates of Glasgow and John W. Bruce.

These were two actions brought by the Partick, Hillhead, and Maryhill Gas Company to restrain the Magistrates of Glasgow, acting under the authority of the Glasgow Corporation Gas Acts, from (1) removing or disconnecting from the gas-pipes at present connected with them any gas-meters belonging to the complainants in any of the houses opening from the common closes or stairs situated at Nos. 23 and 25, Belmont Street, and Nos. 27, 29, 31, and 33, Lacrosse Terrace, Hillhead, or from any way interfering with the meters; (2) from in any way cutting, disconnecting, or otherwise interfering with the gas-pipes leading from the main pipe or pipes of the complainants in those streets; and (3) from connecting any of the gas pipes or mains of the respondents with the pipes leading from the complainants' pipes to the meters, and from conveying the respondents' gas through these pipes.

The complainants stated that their Company was formed in 1871 for the purpose of supplying with gas the burghs of Partick, Hillhead, and Maryhill, and the adjoining districts and places. It was formed by the principal members of the Local Authorities of those burghs, and by other gas consumers in the district, as a measure of protection against the action of the Corporation of Glasgow, who, on acquiring, shortly before that date, the former Gas Companies, by whom Glasgow and the surrounding districts were supplied, had refused to serve the inhabitants of the above burghs with gas except at a rate of charge in excess of the price charged to the consumers in Glasgow. The complainants at present supply about five-fifths of the gas consumed in their district. The property at Belmont Street and Lacrosse Terrace was erected about 14 years ago, and since the formation of the Company; and at the request of the proprietor and tenants, the complainants introduced their gas supply into the property, for which purpose they laid the necessary main and branch pipes, fitted up meters, and have since supplied gas continuously to the occupiers of the tenements. The respondents had, it was believed, recently induced some of the tenants in the property to agree to take their gas in place of that of the complainants, and had intimated their intention of taking possession of the pipes at present used for the supply of gas not only to such tenants, but to others who desired to continue with the complainants. They had also intimated their intention of disconnecting the existing meters, and of putting in their own. The employees of the respondents commenced opening the street for the purpose of carrying into effect these operations in June last, and the complainants believed that they intended to proceed immediately with them, unless prevented by order of the Court. The complainants had no desire to interfere with the respondents inserting their own connecting pipes and meters into the property, and to allow reasonable facilities for the removal of their own meters in cases where the consumer desired to change; but the operations proposed by the respondents constituted a gross invasion of the complainants' rights and interference with their business, and, if permitted, would render it impossible for the complainants, without providing a new pipe at their own expense, to continue their supply of gas either to the present tenants who desired to continue the use of their gas, or to any of the other tenants who might at any time in the future desire a supply from the Company. The gas burned on the common stairs in the property was supplied by the complainants through the pipes which the respondents threatened to disconnect, under an arrangement that the Company should receive in respect of each light the sum of 15s. per annum. The threatened operations of the respondents would have the effect of preventing the complainants from carrying out the arrangements for the supply of gas for the common stair lights up to the term of Whitsunday, 1891, as they had stipulated.

The respondents replied that the complainant Company is a mere private trading company, incorporated under the Companies' Clauses Acts, but having no statutory powers or authority as gas undertakers. The respondents are the only statutory authority for the supply of gas within the districts referred to; and their powers are derived from the Glasgow Corporation Gas Act, 1869. The complainants, with the view of obtaining customers for their gas, have been in the invariable practice of laying, at their own expense, the service or connecting pipes from their mains into the consumers' premises, and have placed therein meters for measuring the gas. The pipes as laid by the complainants are fixed in, and belong to the owners of the premises into which they have been laid; and they could not be removed without breaking the walls of the tenements and the pavements in front. The present owner of the tenements (Mr. John W. Bruce, Accountant, of Glasgow), addressed to the Treasurer of the Glasgow Corporation Gas Department, June 10, 1890, a requisition for the supply of Corporation gas to the premises. This requisition was intimated to the complainants on the 19th of June, with a request that their meters should be removed from the premises within 48 hours, so as to admit of the meters of the respondents being put in. The requisition, as made by Mr. Bruce, the respondents were bound, in terms of section 64 of their Act, to comply with. The respondents accordingly disconnected the complainants' main from the service-pipes within the tenements, connected their service-pipes with their own main, and had already disconnected the meters in all the houses (except two) in the tenements, and connected their own meters with the service-pipes. The respondents' operations, however, were not commenced till after the expiration of the notice given by them to the complainants without their request being complied with by them. In the case of Lacrosse Terrace, the respondents had laid their own main-pipes; but work had been suspended meanwhile, pending the decision of the Court.

Mr. COMRIE THOMSON and Mr. GUTHRIE appeared for complainants; the DEAN OF FACULTY, Q.C., and Mr. URE for respondents.

Mr. URE moved that the interim interdict, granted by the Court,

should be recalled. He said that when the application was made, the meters inside the houses at Belmont Street had already been disconnected from the pipes, and had been laid aside for the complainers' use, with liberty to them to take possession of, and carry off whenever they pleased; and the meters belonging to the Corporation had already been connected with the pipes. The service-pipes had also already been severed at a point below the asphalte pavement in front of the house, and had been luted or sealed up; and the Corporation service-pipe had been connected, and gas had already been passed through them. So that everything against which the interdict was sought, had already been done at the date of the application. In these circumstances, he should certainly maintain that, on the ground of convenience, it was apparent the interim interdict should be recalled. His Lordship would see that the only thing which could now be interdicted was the passing of the gas from the mains into the houses. If his Lordship were to continue the interim interdict, he (Mr. Ure) supposed no gas would be allowed to pass into these tenements until the whole pipes were re-fitted and complainers' pipes re-attached, the Corporation meters removed, and the complainers' meters replaced. On the other hand, if the interim interdict were recalled, what possible injury or prejudice could be suffered by the complainers? It could not be suggested that their pipes could be in any way injured by the passing of the Corporation gas. On the merits of the case, he submitted that, on a *primâ facie* view, it was equally clear for the respondents. The premises consisted of a large flatted tenement of small dwellings. It was built 14 years ago, and at that time, the complainants said, they laid their pipes into all the houses, and supplied gas to the occupants. They did not say—and this was important—that they did so under an agreement of any description with the proprietor. They put in their pipes; and he supposed it was quite within the knowledge of anyone that they were let into the walls. The service-pipe which served these pipes was laid from the main underneath the asphalte pavement and up the inside of the common stair, connecting with the pipes into the tenements. The inference was that the pipes, being fixed into the property, must belong to the proprietor. The question was whether, when the proprietor ceased taking the gas, the Company were entitled to go into the premises, break open the walls, and remove each pipe. Nobody had ever yet suggested that a gas-pipe in a house belonged to the owner of the pipe as distinct from the owner of the house, and for this reason—that, according to the definition of the word "annexation," it was something "fixed into," and not merely placed in juxtaposition with a heritable subject, and which was insusceptible of being removed without injury to the subjects to which it might be annexed. It was the old case of a man building with his own materials upon another man's ground, in which case the materials ceased to be his, and belonged to the other man. The Corporation were precluded from putting pipes into tenements unless they were compensated. The Company, being a private trading concern, were entitled to say: "We want you to take our gas, and therefore we will put our pipes into your house."

Mr. GUTHRIE said there were two interdicts, and his learned friend apparently asked that only one should be recalled. The Lacrosse interdict was in this position—that the gas continued to pass from the Company's mains into the houses, as it had done for the last fourteen years. In the case of the Belmont property, the Corporation intimated to them that at the end of 48 hours they intended, on account of a certain requisition they had received, to disconnect the Company's meters from the premises. They wrote on the 19th of June, that they would do so 48 hours from that date; but the Company only had the letter on the 20th—that was to say, they only had 24 hours' notice. The Corporation letter stated that the gas was to be supplied to the people in the tenements. The fact was that this was a case of a proprietor who was a great ally of the Corporation in their annexation schemes. They answered the Corporation letter on the 20th; stating that they had not received any request from the occupants of the houses to remove the meters, and that it was, therefore, impossible that they should do so; also pointing out that the pipes belonged to the Company, and that it would be wrong for the Corporation to use them. The Corporation knew exactly the position the Company took up; but they proceeded to act, although they had only given them 24 instead of 48 hours' notice. The Company at once told the Corporation that, if they proceeded, interdict would be applied for. What appeared to have been done was this: The Corporation hurried on their proceedings in Belmont Street. They broke up the street, took possession of pipes which had been admitted for 14 years to be the Company's, and then proceeded to connect their own. He believed that in Edinburgh they had on many common stairs two sets of pipes, the property of the two Companies that formerly existed. In this particular case, they had only one pipe—that which belonged to the Company. There had been a practice generally recognized, that they were never to touch each other's pipes; and this was the first occasion since 1871 that any attempt had been made to go back upon that practice. What the Corporation did was to go and remove the meters against the wish of the tenants, one of whom refused to allow their servants' entrance, and they had actually to force their way in. And then they went to the street and disconnected the Company's pipe, and connected their own—all in face of the knowledge that the Company were to present an interdict. When this was served, they had not passed any gas through the pipes. He was told that the Corporation had not obeyed it. Had they not sent gas through their pipes, the Company would have gone and disconnected the Corporation's meters, and connected their own—a very simple matter, which would have taken only about half-an-hour. The Corporation said *primâ facie* they were right, because they had the proprietor with them; but he (Mr. Guthrie) submitted that that must fail. They set out the statute, which they said was a complete warrant for what they had done. What he wanted was that matters should be simply preserved as they were. The proprietor was there. But what business had he with it? He had let the houses for twelve months; and, manifestly, the occupier had a right to say what gas he was to use. They ought not to allow the landlord, in the middle of the tenancy, to go in and alter the arrangement for the supply of gas. The landlord had no right whatever to send any workmen, or any other person, into the house he had let, except for the purpose of preventing damage. The fact of the matter was—and they had intimated this to the Secretary of the Commissioners—that the Company had letters from all the tenants who were at home expressing a desire to continue to take their gas, and stating that they had given no instructions for Corporation gas to be introduced. Suppose the pipes were not the landlord's—supposing Mr. Bruce had let them to the tenants—the tenants were entitled to say that they would have the Company's gas through them, and that they would not take the Corporation gas. He thought this was quite sufficient to justify the interim interdict standing. But supposing the tenants were not there at all—supposing the question were, pure and simple, whether the pipes belonged to the complainants—that was manifestly a question which would have to be seriously considered. His learned friend assumed that the pipes were fixed into the walls. This was not the case. So far as the service-pipes were concerned, they were instantly removable. It was true that there were branch connections leading into the houses, which were sunk into the walls; and it might be that the very ends of these pipes could not be removed, and would have to remain. But this did not in the least settle the question. The position of the pipes on the common stairs was exactly the same as in the streets of Glasgow, for a common stair was in effect a street. He did not know whether or not the Corporation asserted that they were entitled to take possession of the Company's mains in the streets, and to appropriate them. If they were not, how were they entitled to do so with regard to pipes on common stairs? In this particular property, there had been a certain position of matters for 14 years, which it was now proposed to invert. He should mention this, that on the record the Company had made what he might call a mistake in admitting too much. They said: "The respondents have, it is believed, recently induced some of the tenants in the property to take their gas." The Company made this statement in their garrulous simplicity, relying on the Corporation's statement; but they had failed to discover any tenant who desired to have the Corporation's gas. Mr. Bruce had been very strong in his wish to spoil the Company, and thus to facilitate the annexation scheme. There was no doubt that the Company, when it came into being, destroyed a monopoly that existed before. It now possessed five-sixths of the whole gas supply of the district. If these proceedings were allowed to go on, what would happen was this: The Corporation were using this as a "feeler;" and if it were allowed they would go on, making use of the Company's pipes by getting people to forward (as Mr. Bruce had done) notices asking for Corporation gas to be supplied. The result would be that the Company would be squeezed into a corner; and when the Corporation came to take the concern over, as it was quite clear they would have to do in a few years, they would be able to buy it up for an old song.

Lord KINCAIRNEY: Supposing these pipes belong to Mr. Bruce, the Corporation will succeed altogether?

Mr. GUTHRIE: They will after next Whitsunday; but not till then. Up till Whitsunday, 1891, even although the pipes belong to Mr. Bruce, they are let to the tenants; and unless he gets the consent of the tenants, which he has not obtained, he has no right to interfere with the pipes.

Lord KINCAIRNEY: Supposing you are proved, to be in the right, what is the harm done to you by the action of the respondents in Belmont Street?

Mr. GUTHRIE: It interferes with what we have been doing all the time. It interferes with our rights; and the tenants say it interferes with theirs.

Lord KINCAIRNEY: It is an injury which could be easily rectified.

Mr. GUTHRIE: It is an injury which could be rectified by damages.

Lord KINCAIRNEY: Suppose I grant interim interdict, what will happen in Belmont Street?

Mr. GUTHRIE: The Corporation will at once stop sending gas through their pipes, and we will at once reconnect ours; and the state of matters which has existed for 14 years will be re-established, and will continue until your Lordship decides the question on its merits. In the case of the Lacrosse property, the Corporation have not yet connected their pipes. They are laying a main, and the Company saw at once that they intended to connect their pipes with the new main; but since the interdict was applied for, they have not interfered with the Company's pipes at all.

The DEAN OF FACULTY, replying for the respondents, said they were there only on a question of regulating interim possession. Certainly the note of suspension and interdict was very curious. It was at the instance of one supplier of gas against another, without in the first place calling either the landlord or the tenants. That was plainly a situation that was absurd. But the landlord had now been brought into the case; and his Lordship had before him a very different situation from that which existed when, on an *ex parte* statement, an interim interdict was granted. Then the matter looked very like a trespass upon property; and his Lordship preserved the *status quo*. But by the time the landlord was brought in, the works in Belmont Street had been completed. With regard to this there were two separate points, one of which was conclusive—viz., that the work was done before the interdict was served; and the other was that there was not appended to the petition a prayer to undo the act which had been done. Accordingly, his Lordship was asked to interdict something which had been already done. What right had a supplier of gas, even if he had a contract for a year, to say: "I shall persist in sending gas into your house, whether you want it or not?" The thing, on the face of it, was absurd; but it was all the more absurd when he did not say that there was any contract between the landlord and the tenant entitling that body to supply gas for any period. Even if there had been a contract, the tenant or the owner would be entitled to say, on paying damages: "I do not want any more of your gas." But there was no case of that here—there was no contract here. The complainants alleged it on the record; but let them show it in writing. One thing seemed certain—that the Company could not perform the operations which were necessary to enable them to supply gas without entering upon, interfering with, and breaking into the property of the landlord. It was not to be assumed that they were to be entitled to do this without the landlord's consent. A gas supply being now afforded to this building with the assent of, and on the statutory requisition of the landlord, was in itself conclusive against allowing an interim interdict to stand against it. But independently of

that, this was plainly a question in which the owner was very largely interested, because it raised a point with respect to the gas-fixtures, part of which were under the ground. They disputed as to how far the pipes were enclosed in the wall; and their opinion was that they were plastered in. But this did not matter much, because it was certain that in the street they were laid in the private property of the owner. The Company was a private undertaking working without statutory powers to open streets; and the fact seemed to be that, in their eagerness to supply gas, they put in their pipes. Without asking his Lordship to decide who had the property in these pipes, the Corporation said *primâ facie* they were part of the structure. If the Company had the right to take them away, let them try that point on an appropriate issue; but this was not the question here. What the respondents said was that there were pipes built into a man's property—running below the pavement, and carried through every wall and into every room of his house. But it would surely require a great deal of presumption to assert that these pipes were not part of the property. Here the owner said: "I do not want your gas, but I want other gas through the pipes in my house, which have become mine through annexation." If the Company had said: "No; you will not get it through our pipes—we will take our pipes away"—that might have been right. But they did not say that; they said: "No; these pipes are ours, and we will make you allow them to remain and take our gas through them." His learned friend had brought a number of letters from tenants. They were all signed, he observed, by ladies; and they were all written upon the Company's paper. He did not know how they obtained these signatures—whether they threatened to cut off the gas or not. Surely the landlord of a tenant house, where there was only one pipe coming into it from the main, must have the power of saying who was to supply the gas through his property. He could not have each tenant saying he wanted this or that particular gas. It was perfectly clear that the tenants must take the landlords' equipments for the supply of gas. There was also the question of the light for the common stairs, the liability for which lay, in the first instance, upon the landlord. If there was any question to be tried as to the right of property, he submitted that, as regarded the Belmont property, it should be tried without a standing interdict, for the reasons that the fact was done, and that they had a person intervening and saying that *primâ facie* the pipes were his. He pressed the matter in the interests of the Corporation, and said that if the Company claimed property in these pipes, their right was to take them away. What he asked his Lordship to consider was whether there was any instance in law where a third party had a right to leave his property in another man's house, and to insist that it should remain.

Mr. COMRIE THOMSON, replying for the Company, said that the case depended upon the expediencies. The complainants had had a long period of uninterrupted and peaceful possession. Mr. Bruce acquired the property in November, 1889; and he now came to his Lordship asking him to interrupt and sanction an inversion of the state of things which had lasted so long. He (the learned Counsel) quite admitted it would be open to either the landlord or the tenant, at the end of a year, to make a new arrangement. But when hitherto anyone had asked for a new gas supply, the persons asked had allowed the old pipes to remain, and had put in new ones of their own. Was there law for holding that these pipes had become the property of the owner of the subject? This was a question in which there was plainly room for serious doubt; and that doubt could only be extinguished by inquiry. Whatever might be the presumption, he could not allow that of his learned friend—viz., that whatever they might find in the walls of a house had become the property of the owner of the house. In the case of pipes, he looked upon it that it was the same as in the case of a telephone wire. Would it be held that a man who did not pay for his telephone should be entitled to compel the wires to remain? A landlord had no right, in the middle of a tenancy, to come to his tenant and make an alteration in respect of the supply of gas, which the tenant alone was using, and for which he alone paid. He was under obligation to the tenant to supply it.

Lord KINCAIRNEY: Where is the bond?

Mr. COMRIE THOMSON said it was not suggested by his learned friend that the Corporation gas had ever been supplied to this tenement since it was erected. As to the stair gas, he understood that the landlord was bound to supply the fittings on the stair. But the tenant was the person who had to pay for the gas that was consumed; and the tenant was the person who would be fined by the police authorities if he failed to light the gas. There was no advantage to be gained by the change. It was not as if some public end was to be served, or some mischief prevented. Whether or not the landlord could take possession of the pipes was a matter to be tested as a question of law; but there was no reason why things should not remain as they had done for so long.

Lord KINCAIRNEY said that, so far as he could follow, the real interest of the parties was this: The complainers thought they could put a competing body to the expense of putting their own gas-pipes in, or make themselves out to be proprietors of the pipes already in. If they could do this, they had a certain advantage, as they might compel Mr. Bruce, unless he were very enthusiastic in the public interest, to take their gas. He was not going to decide this question, nor was he going to say whether the gas-pipes belonged to the one person or the other. This was decidedly not a question of whether or not the pipes belonged to the Company, and whether, so long as they were their property, they could prevent Mr. Bruce or the Corporation from sending gas through them. This was a different matter. If there was no question with the tenants, the proprietor would have a very strong position; but there was one. Some of the tenants preferred one gas to the other. These were, however, questions he ought not to decide at all. The main question, he thought, must depend upon the understanding of the parties at the time the pipes were laid. He considered he had nothing to do with anything except the immediate interests of the parties. He had to consider which was the most expedient course, and which would cause the least inconvenience. He rather thought that in the case of the Belmont property, the thing being done, he should leave it alone, and allow the Corporation to supply gas in the meantime—not interdicting them. But in the case of the Lacrosse property it was different, because there the Corporation had done nothing, and could do nothing because of the interim interdict. He left all other questions of right entirely undecided, and gave no expression of opinion upon them. But he thought that by interdicting the Corporation from supplying gas to the Belmont property, he might create a considerable amount of inconvenience, for which he did not quite see the immediate remedy. The complainants might have a remedy by other means; and if they were in the right, it would do them no harm at all if the Corporation supplied gas to the Belmont property in the meantime. On the other hand, he did not see any reason for interfering with the *status quo* in the case of the Lacrosse property. If the Corporation were right, and had a right to supply the gas, they would have that question decided when the case came into Court. He re-called the interim interdict in the case of the Belmont property; but in that of the Lacrosse property he saw no reason for interfering with the *status quo*, and therefore he continued the interim interdict.

The effect of this judgment is that the case will go into the Court of Session to be tried on its merits; but this will not take place till October next.

Extension of the Abercarn Gas-Works.—At a special meeting of the shareholders of the Abercarn Gas Company held on Monday last week, authority was given for the creation of new capital to the extent of £2000, which it is intended to expend in the enlargement of the works to meet the increased demand for gas.

Completion of the Vyrnwy Water-Works.—The great undertaking in which the Liverpool Corporation have been so long engaged for the supply of water to the city from Lake Vyrnwy, is now practically finished, as evidenced by the sale by auction of the plant and machinery specially manufactured for, and used in the construction of the works. Owing, however, to various unavoidable circumstances, causing unforeseen delay at the Liverpool end of the aqueduct, the ceremony of opening the works and delivering water to the consumers, which it was hoped would take place this summer, has had to be postponed.

Albo-Carbon Light Company, Limited.—According to the report presented by the Directors of this Company at the twelfth annual meeting, held on Monday last week, the sales in the year ending June 30 30 last were not so good as those in the preceding twelve months. This diminution, however, was promptly met by a commensurate decrease in the working expenses. The Directors think that the decline is due only to a general pause in the lighting trade of the kingdom after a decade of activity; and that so soon as the question of economy in lighting again attracts public attention, the established reputation of the albo-carbon light will bring it a largely increased business. They believe that the Company's system (now in the twelfth year of its existence) is at present the only patented light in England which is earning a profit from the business of lighting solely. The balance at the credit of the trading account was £1379 8s. 1d., which, with £100 17s. 2d. the net balance brought forward from last year, as the balance at the credit of the profit and loss account, left £1480 5s. 3d. Out of this sum the Directors proposed a dividend of 7½ per cent. for the year, free of income-tax; and this was declared.

Spiel's Petroleum Engine Company, Limited.—An extraordinary general meeting of this Company was held last Tuesday, at the offices, Leadenhall Buildings, E.C.—Major Heritage presiding—for the purpose of explaining the present position of the Company. The Chairman stated that arrangements had been concluded which had put an end to all litigation and questions between the Company and Messrs. Shirlow and Co., who had surrendered the exclusive licence held by them. This being the case, they had granted Messrs. Clarke, Chapman, and Co., of Gateshead, a licence, but not, as before, an exclusive one. It left their hands free to grant licences to other people, if they found it to be to the interest of the Company to do so, with the exception of machines used for the purpose of the generation and distribution of electricity. The firm attached considerable importance to having the exclusive right of manufacturing the installation machines; and, consequently, this had been given them. It appeared to him that, after having struggled with the serious difficulty of having Messrs. Shirlow and Co. about their neck, the prospects of the Company, with the business in other hands, were now much more promising than they had ever been before.

The Oil Lighting at Erith.—At a recent meeting of the Erith Local Board, a letter was received from Mr. D. C. Defries, from which it appeared that the question of damages to the oil-lamps was still far from settlement. One member (Mr. Corbett) inquired if the lighting contract would not soon be at an end, to which the Clerk replied that it would not terminate till next year. This elicited a kind of wail of misery from the questioner, who exclaimed: "Another year of Defries!" The Clerk went on to say that numerous lamps had been out lately; and a member added: "And the overflow of oil has been something dreadful." Mr. Corbett said that a few days previously, when walking down the Station Road, Belvedere, he saw a large pool of oil, from one of the lamps, on the footpath; and he found that two drops were falling every second. The Chairman (Mr. Streeten) said the same thing was going on in the Bexley Road. Mr. Corbett wished to know what remedy a passer-by would have if his clothes were injured by the dropping oil. The Chairman thought it was unwise to try to draw an expression of opinion on this point from himself or the Clerk; at the same time, if any ratepayer chose to bring an action against the Board for damages caused to his clothes, he thought the Board would have their remedy against Messrs. Defries. The whole matter stood thus: The Board were unable to agree with Messrs. Defries as to what constituted "wilful damage" in this matter of the spilling of oil. The Clerk had been instructed to resist all claims, and allow Messrs. Defries to take what steps they thought proper. He considered the best thing for the Board to do would be to instruct the Clerk to draw the contractors' attention to this oil business, and inform them that they would be held responsible for any damage done. He personally would be glad if some ratepayer would bring a test action against the Board; and then they could proceed against Messrs. Defries. It was decided that the Clerk should write again to the firm, and point out the nuisance caused by the spilling of the oil.

MISCELLANEOUS NEWS.

THE EXAMINATIONS IN GAS MANUFACTURE.

We have been favoured by the Organizing Director of the City and Guilds of London Institute (Sir Philip Magnus) with a list of the successful candidates in the last examinations in "Gas Manufacture," which form part of the scheme of Technological Examinations conducted by the Institute every year. The following are the names of those who passed :—

HONOURS GRADE—

First Class.—Clayton, T.; Everitt, W.; M'Carter, H. R. (with Second Prize, a Silver Medal); Stagg, W.; Stubbs, E. F.; Whyte, W.

Second Class.—Clark, G. H.; Heaps, J. W.; Love, G. R.; Paterson, P. J.; Randall, W. B.

ORDINARY GRADE—

First Class.—Donaldson, W. L.; Methven, W (with Second Prize, a Bronze Medal); Watson, R.

Second Class.—Buckley, H.; Charlton, W. T.; Chattaway, W.; Cunnold, C. A.; Currie, W.; Gibson, J.; Hesketh, S.; Holdsworth, C. B.; Hole, S.; Lee, F.; Thornton, T.; Turner, G.; White, J.

GLASGOW CORPORATION GAS SUPPLY.

The Twenty-First Annual Report of the Gas Committee.

The Glasgow Corporation Committee on Gas Supply has just had prepared for the Town Council their twenty-first annual report, with statement of accounts for the year extending from June 1, 1889, to May 31, 1890. These will have to be considered at a meeting of the Council to be held to-morrow. Under the head of "Finance" we find that—

The gross revenue amounts to			£417,589 0 5
The gross expenditure to	£317,825 17 8		
To which is added depreciation written off capital	£41,920 0 7		
Extra sum to meet the renewals at Tradeston station	10,800 0 0		
	52,720 0 7		
		370,545 18 3	
The balance carried to the profit and loss account being		£47,043 2 2	
Out of this the following sums have been met:—			
Annuities on stock	£33,893 8 10		
Interest on borrowed money	10,076 19 6		
	£43,970 8 4		
Sinking fund	3,000 0 0		
		46,970 8 4	
Leaving surplus on year's operations of		£72 13 10	
The balance brought forward from the previous year's account was	£5,173 3 5		
Out of this there has to be paid to the Corporation for general purposes, in terms of the minute of the Town Council dated Sept. 5, 1889	2,000 0 0		
Leaving	£3,173 3 5		
Adding thereto the above surplus	72 13 10		
Makes a sum to be carried forward to the credit of next year's account of	£3,245 17 3		

The Committee state that, as usual, they advertised for tenders for coals to be supplied during the current year, and have contracted for a large portion of the quantity required, at a considerable increase over last year's prices. Having regard to this fact, and to other possible contingencies, the Committee do not feel justified in proposing any reduction in the price of gas for the current year; and they therefore recommend that it be continued at the same rate as last year—viz., 2s. 6d. per 1000 cubic feet. The quantity of gas sold or accounted for during the past year was 2,752,989,000 cubic feet; being an increase over the preceding year of 5·40 per cent. With its accumulations, the sinking fund now stands at £227,123 2s. 5d.

In dealing with "Works," the report states that they have been maintained in an efficient condition during the year. New condensers are being erected at Dalmarnock, which, it is hoped, will be completed so as to be of use during the coming winter. The addition to the gasholder at Dawsholm, mentioned in last year's report, was completed about the beginning of December, 1889. Another gasholder is this year being similarly increased in size; and a new set of exhausting machinery has been ordered for this works. Speaking of the reconstruction of the Tradeston works, the report says it will, it is hoped, be so far completed by the end of September as to enable the old apparatus to be put out of use. One retort-house was finished in time to be fully at work last winter, and the second has been completed for some months. The construction of the other portions of the apparatus is well advanced.

The loss by unaccounted-for gas during the year was 9·98 per cent., as compared with 10·11 per cent. in the year 1888-90. The greatest quantity of gas sent out in a period of 24 hours was 16,566,000 cubic feet; being 245,000 cubic feet less than the largest output in one day in the preceding year.

On May 31, 1890, there were 134,215 meters in use; being an increase of 3592 on the number at the same date in 1889. During the year, 17,993 meters were repaired; 9027 were examined while in use, of which 7946 were found to be in a satisfactory condition, while 1081 defective ones were removed. New mains of a total length of 17,224 yards were laid during the year. The total number of gas-stoves lent out on hire on May 31 last was 6615; being 1117 more than at the corresponding date last year. The number of gas heating and cooking appliances sold during the year was 1482.

The various accounts, which follow in regular order, begin with a statement of the stock capital as on May 31, 1890. This consists of perpetual annuities, which were created out of the shares of the Glasgow Gaslight Company and the Glasgow City and Surburban Gas Company—collectively, £300,000 of 9 per cent. annuities, and £115,000 bearing interest at 6¾ per cent. per annum. The yearly annuities or dividends amount to £34,762 10s. As loan capital, the Gas Commissioners have powers authorizing them to raise on loan a total of £1,000,000; but scarcely one-third of this amount has yet been borrowed. Correctly, up to May 31 last, the sum is £244,632 15s. 11d. The major portion of this is bearing interest at 4 per cent. per annum; and the rate paid for the remainder is 3½ per cent.

In the capital account it is shown that the property belonging to the Gas Trust amounted on May 31 last to £637,132 1s. 1d. Of course, this is the net amount; the deductions for depreciations (in nearly all cases at the rate of 7½ per cent.) having been made. In this way, the Dalmarnock station and works stand for £89,727 13s. 4d.; and the Dawsholm station and works, for £129,316 1s. 2d. During the year additions were made at Tradeston station and works which involved an expenditure of £57,437 11s. 3d.; bringing their total value up to £106,433 18s. 5d. But of this amount an extra sum of £10,800 has been written off to meet renewals; so that the value of the Tradeston property actually stands at £95,633 18s. 5d., or nearly £6000 more than the value of the Dalmarnock property. The other items of property belonging to the Gas Trust include some at Partick (where there was formerly a gas manufacturing station); the workshops in Sterling Street, now rated at £12,137 3s. 9d.; the offices in Virginia Street, at £9539 6s. 6d.; the chemical works at Dawsholm (with additions during the year), £7509 0s. 1d.; workmen's dwelling houses at Dawsholm, £1916 7s. 11d.; pipes and the cost of laying (with extensions during the year), £165,013 16s. 9d.; gas-meters (including additions during the year rated at £9003 14s. 8d.), £108,359 15s. 6d.; gas-stoves, &c., £14,524 12s. 6d.; and counting-house furniture, £350.

In the revenue account, the gross expenditure is shown to have amounted to £317,825 17s. 8d., of which £255,602 5s. 10d. is set down for gas manufacture—the major portion being for coals (319,417 tons 7 cwt.), and amounting to £158,407 14s. 7d. Workmen's wages came to £59,254 9s. 6d. For the distribution of gas there was expended a sum of £33,694 17s. 6d., of which £7907 0s. 6d. was for salaries of surveyors and inspectors of meters and clerks in the survey-room. Another item was £14,192 19s. 9d., for repair, maintenance, and renewal of mains and service-pipes, including materials and laying, paving, and labour; and nearly £11,000 was for the repairing and refixing of meters. The outlay for rents, rates, and taxes was £18,234; for management (Treasurer's department, &c.), £8061 8s. 1d.; for law and parliamentary charges, £1964 19s. 6d.; and for retiring allowances to old servants of the Gas Companies, £268 6s. 9d. The amount written off for depreciation—on works and pipes at 7½ per cent., and on meters at 6 per cent.—amounted to a total of £52,720 0s. 7d. For gas sold during the year 1889-90 there was realized a sum of £334,006 16s.; and in the shape of arrears on previous years there was recovered over the estimate £5498 4s. 7d.—the total being £339,505 0s. 7d. For coke sold there was obtained a sum of £27,200 9s. 2d.; for ammoniacal liquor and tar, £49,425 11s. 7d.—together, £76,626 0s. 9d. Waste lime realized £800 16s. 9d. For rents of house properties and chemical works there was obtained £648 2s. 10d. Transfer fees amounted to £8 19s. 6d. These items give a gross revenue of £417,589 0s. 5d., as already mentioned.

The accounts also show that the sinking fund on May 31, 1890, stood at £227,123 2s. 5d., of which £224,123 2s. 5d. was invested, They also include a detailed statement bearing on the sale and hire of gas-stoves, &c.

BRENTFORD GAS COMPANY.

The Half-Yearly Report and Statement of Accounts.

In the JOURNAL last week we mentioned that the dividends proposed to be declared at the half-yearly meeting of this Company next Friday will be at the rates of 5, 12½, and 9½ per cent. per annum on the various classes of stock. The Directors, in their report, state that arrangements have been made at Brentford and Southall for the use of inclined retorts; and they announce that in consequence of the increased cost of coal and other material, as well as of labour, they have notified to the consumers an increase of 2d. per 1000 cubic feet in the price of gas. The Company a few months ago sold £25,000 of new stock, which realized £39,687 11s. 3d. The receipts for gas in the past half year amounted to £70,635; the meter and stove rentals produced £3172; and the residuals, £22,218—the total receipts being £96,114 8s. 9d. The manufacturing expenses came to £53,846 (coal costing £32,801); distribution, to £5709; and management, to £3790—the total expenditure being £69,216. The balance carried to the profit and loss account is £26,898. The quantity of coal carbonized in the six months to June 30 last was 48,489 tons, as compared with 47,287 tons in the first half of 1889. The residuals produced were: Coke, 31,935 tons; breeze, 4243 tons; tar, 509,347 gallons; ammoniacal liquor, 14,508 butts (including 385 butts purchased). There were 527,827,000 cubic feet of gas made, as compared with 509,099,000 cubic feet in the corresponding six months of 1889. Of the entire bulk, 447,036,000 cubic feet were used for private, and 48,115,000 cubic feet for public lighting in 4958 lamps; and 7500 cubic feet were used on the works and for gas-engines; the total accounted for being 502,651,000 cubic feet.

Increased Gas Storeage for Vienna.—The Imperial Continental Gas Association are having erected at their Vienna works a three-lift holder which, when completed, will be the largest yet constructed on the Continent. This important work is being carried out by Messrs. Samuel Cutler and Sons, of Millwall.

THE GASLIGHT AND COKE COMPANY.

The Working in the Past Half Year.

The following reports, with the accounts, showing the working of the Company during the six months ending June 30 last, will be submitted to the proprietors at the ordinary half-yearly meeting which is to be held next Friday :—

Report of the Directors.

The accounts of the half-year's working are herewith submitted. After making provision for all fixed charges, a balance of £362,983 2s. remains, which is applicable to dividend on the ordinary stock of the Company.

The causes of the reduction of profit shown on the Company's business (apart from the increase by about £100,000 for the half year in the price of labour, and the additional cost of all materials referred to in the last report) are, first, the rise in the price of coal; and, second, the absence of increase in the quantity of gas sold during the earlier months of the year. The latter is due to the high temperature and the marked absence of dark and foggy weather which characterized the winter months of the half year. As regards the former, the rise is no doubt due to a great extent to the disturbed condition of the labour market in the mining districts, which has not only added to the cost of raising the coal, but has also restricted the output; while, at the same time, improved trade in the country has led to a larger demand. Fortunately, the Company has not suffered from the rise in the price of coal to the extent which might have been apprehended; the beneficial terms of their expiring contracts having enabled the Directors to negotiate those which have just come into operation from an advantageous position. By a re-arrangement of their then existing contracts, some of which had still several months to run at low prices, the Directors were able to provide for the whole of their present requirements on equitable and favourable terms. Some portion of the increased price they have had to pay will be met by the improved value of coke. But the general result, notwithstanding the abolition of the coal dues of 1s. 1d. per ton, will be an additional charge on the Company for coal of nearly £300,000 for the year under the present contract price, as compared with those in force in the corresponding period of last year; and though the Directors do not believe that the existing high price of coal is likely to be permanent, they are of opinion that the changes in the hours of work and rates of pay will prevent prices again falling to the admittedly low level of late years.

To meet the heavily enlarged demands on the Company, the Directors have, from Midsummer last, advanced the price of gas from 2s. 6d. to 2s. 9d. per 1000 cubic feet; and, under the sliding scale, this rise of 3d. in price involves a reduction of ¾ per cent. in the rate of dividend—that is, to 13 per cent., which rate the Directors recommend should be declared.

The extensions and renewals of the Company's plant are being made in accordance with the latest improvements in retort-setting and coal-handling; and, while the new processes of manufacturing gas now being experimentally tried give promise of the attainment of economies in working which are expected to secure the further profitable development of the Company's business, the Directors are happy to add that their relations with their workmen are of a satisfactory character.

The legal proceedings between the Company and the South Metropolitan Gas Company, in reference to the gas supplied to the Nine Elms Goods Station of the London and South-Western Railway, are being brought to a close. The Special Referee appointed by the Court and accepted by both Companies has published his award, under which the damages sustained by this Company, irrespective of interest and costs, are assessed at the sum of £5804 15s. 2d.

During the present session several Bills were laid before Parliament, which, if they had been passed as introduced, would have prejudicially affected the Company. The opposition of the Directors to these measures was in every instance successful; the Company obtaining ample protection.

To provide for the extensions of works now in progress, and those rendered necessary by the increasing requirements of the consumers, the Directors, as stated in the notice convening the meeting, will apply to the proprietors for authority to create and issue 6 per cent. preference stock to the amount of £476,000; and they propose to immediately offer £176,000 thereof for sale by tender, together with the £258,000 of 6 per cent. debenture stock for the creation of which the sanction of the proprietors has already been obtained. Payment in full of each class of stock will be required on or before the 27th of August; and, for the convenience of the proprietors, forms of tender for both classes of stock will be posted to them immediately after the meeting, with full particulars relating to each issue.

WILLIAM THOMAS MAKINS,
Horseferry Road, Westminster, S.W., Governor.
July 25, 1890.

Engineer's Department.

I beg to certify that the whole of the Company's gas manufacturing and storeage stations and also distributing plant under my charge have been kept in good repair and efficiency during the past six months. Important additions to the Company's manufacturing plant are in progress at the Beckton, Kensal Green, and Nine Elms works, which will increase by about 6 millions per diem the manufacturing power of the Company against next winter. Further extensions are in progress at the Beckton works, to be completed by the winter after next. Two large gasholders have also been contracted for—one to contain 8 million cubic feet, to be erected at Beckton; and the other to hold 7½ millions, at the Kensal Green station. The tanks for these are now being made, and will be finished this year; and the gasholders are to be ready for use by the winter of next year.

G. C. TREWBY, Chief Engineer.

Distribution Department.

I hereby certify that during the past half year the whole of the distributing plant under my charge has been maintained in a thorough state of repair and efficiency, and the various pressures of gas have been well regulated.

G. F. L. FOULGER, Chief Inspector.

Products Department.

I hereby certify that the whole of the plant, engines, boilers, stillss trucks, machinery, and tools in connection with the Company's products works under my charge have, during the past half year, been maintained in good working order and repair.

THOS. WILTON, Superintendent of Products Works.

Following the foregoing reports is the statement of accounts. As usual we merely indicate here the alterations which have taken place in those portions which are not subject to much variation; reproducing the remainder in full.

Nos. 1 and 2 are the statements of stock, share, and loan capital, the totals of which stand as before—viz., stock and share capital, £8,103,000; loan capital, £2,186,000.

No. 3 is the capital account, which also stands, as far as the receipts are concerned, as at the close of the previous half year—viz., £10,690,000; comprising the above-named amount of share and loan capital, and £401,900 of premium capital. The expenditure is shown in the following items :—

Expenditure to Dec. 31, 1889			£10,388,772 17 4
Expenditure during the half year to June 30, 1890, viz. :—			
Lands acquired, including law charges	£8 13 10		
Buildings and machinery in extension of works	36,043 9 2		
New and additional mains and service-pipes	7,074 8 8		
Do. do. meters	2,531 5 10		
Do. do. stoves	16,076 5 0		
	£61,734 2 6		
Cr.			
By Depreciation of meters £3,921 0 0			
„ Do. stoves 4,825 0 0			
	8,746 0 0		
		52,988 2 6	
			£10,441,760 19 10
Balance of capital account			249,139 0 2
			£10,690,900 0 0

Nos. 4 and 5 are the revenue and net revenue accounts. These are given in full on the opposite page.

No. 6 is a statement showing how the Directors propose to appropriate the balance applicable for dividend. It is as follows :—

June, 1889.				
£304,703	...	Net balance brought from last account	£198,679 17 6	
357,318	...	Net revenue for the half year	164,303 4 6	
£662,021				£362,983 2 0
(13¾ per cent.)		A dividend on the ordinary stock—		
£376,065	...	13¾ per cent. on £5,470,620	—	355,590 6 0
£285,956	...	Balance carried to next account		£7,392 16 0

Nos. 7 and 8 are the reserve and insurance fund accounts. The former shows that the balance of the reserve fund on Dec. 31 last was £517,197 14s. 6d., which was increased at the close of the past half year to £524,296 8s. 6d., by the addition of £7098 14s.—interest on the amount invested. The insurance fund stood at £83,665 9s. 9d. at the end of December last; at the close of the past half year it amounted to £84,813 16s. 5d.

No. 9 is the depreciation fund account. It stood at £36,135 13s. 11d. on December 31 last; and by the end of the past half year it had been raised to £37,381 13s. 5d. by the addition of £750 brought from the revenue account, and £495 19s. 6d. received as interest.

Nos. 10 and 11 are as follows; and Nos. 12 and 13 are given on the opposite page.

No. 10.—STATEMENT OF COALS USED, ETC.

Description of Coal.	In Store, Dec. 31, 1889.	Received during Half Year.	Carbonized during Half Year.	Used during Half Year.	In Store, June 30, 1890.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common . .	83,465	1,083,850	928,159	1,313	237,843
Cannel . . .	17,009	39,942	31,792	—	25,159
Total . .	100,474	1,123,792	959,951	1,313	263,002

No. 11.—STATEMENT OF RESIDUAL PRODUCTS.

Description.	In Store, Dec. 31, 1889.	Made during Half Year.	Used during Half Year.	Sold during Half Year.	In Store, June 30, 1890.
Coke—tons	24,767	591,079	135,179	477,742	2,925
Breeze—tons.	4,703	65,627	24,875	42,852	2,603
Tar—gallons	728,581	10,569,692	10,833,433	11,987	452,853
Ammoniacal liquor—butts	22,627	272,391	269,627	8,373	17,018

The Quality of the Rhondda Water Supply.—At the last fortnightly meeting of the Ystrad Local Board, a letter was read from the Ystrad Water Company, stating that if the Board would furnish dates when sheep-washing and other pollution took place in the stream running into the water-works pipes, as had been alleged, the communication would be laid before the Directors at their next meeting. The Clerk observed that full particulars of such pollution had been supplied to the Company, and consequently the letter was unsatisfactory. Dr. James, the Medical Officer to the Board, subsequently remarked that he had visited the Company's intake at Blaenrhondda about one o'clock that day, and found that the water entering the Company's pipes was polluted as badly as ever. About 200 gallons of dark, turbid water, almost as black and as thick as ink, flowed from an adjacent colliery level in a continuous stream into the intake of the water-works. On this report an animated discussion ensued; and the Medical Officer suggested that the Board should at once communicate with the Local Government Board, or request them to immediately despatch an Inspector to examine the condition of things there. It was resolved that the Clerk should issue a summons against the Company for supplying unwholesome water.

ACCOUNTS OF THE GASLIGHT AND COKE COMPANY FOR THE HALF YEAR ENDING JUNE 30, 1890.

No. 4.—REVENUE ACCOUNT.

Dr. Cr.

June Half Year, 1889.	To Manufacture of gas—	£ s. d.	£ s. d.	June Half Year, 1889.	By Sale of gas—	£ s. d.	£ s. d.
	Coals, including dues, carriage, unloading and trimming (see Account No. 10)	701,428 15 0		£1,631,161	Common gas, per meter, at 2s. 6d. and 2s. 3d. per 1000 cubic feet.	1,631,619 5 10	
£377,354					Cannel gas, per meter, at 3s. 1d. per 1000 cubic feet	43,991 1 0	
	Salaries of Engineers and other Officers at works	10,114 12 6		44,741	Public lighting and under contracts—		
9,863	Wages (carbonizing)	160,558 6 5		64,570	Common gas	66,245 0 1	
124,569	Purification, including £18,830 18s. 3d. for labour	32,319 17 8		2,593	Cannel gas (See Statement No. 13.)	2,591 11 9	
27,301	Repair and maintenance of works and plant, materials and labour, less received for old materials, £1628 18s. 6d.	131,847 7 9		£1,146,000			1,144,377 18 8
111,913				26,131	Rental of meters	..	27,327 17 4
				2,526	Rental of stoves	..	4,982 5 2
			1,045,268 19 4		Residual products—		
	Distribution of gas—			235,482	Coke, less £87,429 6s. 10d. for labour, &c.	241,224 13 0	
	Salaries and wages of Officers (including Rental Clerks)	24,482 2 5		6,439	Breeze, less £3721 9s. 4d. for ditto	7,404 9 4	
23,016	Repair and maintenance of mains and service-pipes	21,717 10 11		79,293	Tar and tar products	169,561 12 9	
21,691	Repair and renewals of meters	15,341 11 1			Ammoniacal liquor and sulphate of ammonia	76,755 10 9	
14,815	Stove fixing, repairs and renewals	21,726 6 5		87,379			434,946 5 10
7,587				3,930	Rents receivable		3,700 14 11
			86,267 10 10	217	Transfer fees		195 17 6
	Public lamps—			300	Canteen account		300 0 0
15,095	Lighting and repairing	15,667 9 10		..			
636	Experimental Street Lighting	141 9 9					
			15,808 19 7				
	Rents, rates, and taxes—						
3,442	Rents payable	3,393 9 2					
79,244	Rates and taxes	78,598 3 3					
			81,991 12 5				
	Management—						
2,750	Directors' allowance	2,750 0 0					
200	Company's Auditors	200 0 0					
7,432	Salaries of Secretary, Accountant, and Clerks	7,756 13 6					
14,602	Collectors' commission	14,470 15 8					
3,477	Stationery and printing	3,696 17 1					
1,789	General charges	1,724 12 3					
			30,598 18 6				
	Parliamentary charges	..	3,103 13 10				
	Law charges (including Surveyor's charges *re* Quinquennial Valuation)	..	2,692 15 0				
1,885	Bad debts	..	6,790 14 9				
7,154	Depreciation fund, for works on leasehold land	..	750 0 0				
750	Annuities	..	9,388 3 8				
9,052							
	Public Officers—						
1,109	Gas Referees and Official Auditor	1,109 5 6					
773	Public testing-stations	1,214 7 9	2,323 13 3				
£1,067,399			1,284,935 1 2				
520,204	Balance carried to net revenue account, No. 5		330,695 18 3				
£1,587,603			1,615,630 19 5	£1,587,603			1,615,630 19 5

No. 5.—NET REVENUE ACCOUNT.

Dr. Cr.

June Half Year, 1889.		£ s. d.	£ s. d.	June Half Year, 1889.		£ s. d.	£ s. d.
£54,920	To Interest on debenture stocks and bonds, accrued to June 30, 1890	..	54,919 12 6	£660,162	By Balance from last account	574,785 0 0	
					Less dividend on the ordinary capital for the half year to Dec. 31, 1889	376,105 2 6	
59,774	Dividend on the preference stocks	59,759 10 0		355,459			198,679 17 6
47,500	Dividend on the maximum stocks	47,500 0 0					
			107,259 10 0	£304,703			
632	Interest on temporary loans and sundry funds		4,318 11 3	520,204	Revenue account (No. 4)		330,695 18 3
662,021	Balance applicable to dividend on the ordinary stock		362,983 2 0				
£824,907			529,375 15 9	£824,907			529,375 15 9

No. 12.—STATEMENT OF GAS MADE, SOLD, Etc.

Description of Gas.	Quantity Made.	Quantity Sold. Public Lights and under Contracts (estimated).	Quantity Sold. Private Lights (per Meter).	Quantity Sold. Total Quantity Sold.	Quantity used on Works, &c.	Total Quantity accounted for.	Quantity not accounted for.	Number of Public Lamps.
	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	
Common	9,514,023	469,150	8,259,037	8,728,187	115,187	8,843,374	670,649	48,137
Cannel	324,951	15,701	284,344	300,045	2,297	302,343	22,609	2,214
Total	9,838,974	484,851	8,543,381	9,028,232	117,484	9,145,716	693,258	50,351
June half year, 1889	9,744,330	471,665	8,592,070	9,063,735	115,378	9,179,113	565,216	49,144

No. 13.—GENERAL BALANCE-SHEET.

Dr. Cr.

June Half Year 1889.		£ s. d.	£ s. d.	June Half Year 1889.		£ s. d.	£ s. d.
£	To Capital—			£			
348,900	Balance at credit thereof	..	249,139 0 2	99,900	By Cash at Bankers	..	53,370 18 1
	Net Revenue—						
662,021	Balance at credit thereof	..	362,983 2 0	500,000	Amount on deposit at interest	..	..
	Reserve Fund—				Amount invested—		
510,195	Balance at credit thereof	524,296 8 6			2½ per Ct. Consolidated Stock £653,315 6 0	..	637,748 18 2
	Insurance Fund—			627,635			
82,583	Balance at credit thereof	84,813 16 5					
	Depreciation Fund—				Stores on hand, viz.—		
34,907	Balance at credit thereof	37,381 13 5		33,033	Coals	203,657 7 5	
			645,491 18 4	13,221	Coke	1,526 7 0	
	Interest on debenture stocks and bonds,				Tar and ammoniacal liquor and		
54,920	due on June 30, 1890	..	54,919 12 6		products	78,992 17 5	
	Preference and maximum dividends			62,672	Sundry stores	157,439 10 9	
107,274	due on June 30, 1890	..	107,259 10 0	136,266			441,616 2 7
	Unclaimed dividends due on June 30,				Accounts due to the Company, viz.—		
10,912	1890	..	10,688 18 1		Gas and meter rental—		
	Sundry tradesmen and others, for			442,749	Quarter ending June 30, 1890	459,084 16 8	
	amount due for coals, stores, and				Arrears outstanding	18,801 3 11	
157,515	sundries	..	213,019 2 2	20,116			477,886 0 7
1,667	Benevolent Fund	..	1,667 6 8				
				34,262	Coke and other residual products	34,674 14 3	
				930	Sundry accounts	871 16 3	
							35,546 10 6
1,970,814			1,646,168 9 11	1,970,844			1,646,168 9 11

EDINBURGH AND LEITH CORPORATIONS' GAS SUPPLY.

Quality of Gas—Proposed Extension of Works—Finances—Increase in the Price of Gas.

At the Meeting of the Edinburgh and Leith Corporations' Gas Commissioners on Monday last week—Lord Provost BOYD in the chair—several important matters were under consideration.

The Engineer of the Edinburgh station (Mr. R. Mitchell) reported, through the Works Committee, that the output of gas from his works in the month of June was 39,443,000 cubic feet—an increase of 10,411,000 cubic feet on the output for June of last year. The illuminating power of the gas was 25·17 candles, as compared with 29·02 candles last year. The Engineer of the Leith works (Mr. F. T. Linton) reported that his output was 13,030,000 cubic feet—a decrease of 1,691,000 cubic feet as compared with June, 1889. The illuminating power was 25·97 candles, as compared with 27·87 candles.

A conversation took place on the reports. The large increase in the manufacture of gas was referred to by Bailie Archibald as being very satisfactory. He remarked that the Edinburgh works showed fully 10 million cubic feet more than in the month of June of last year. Mr. Linton explained that the Edinburgh Exhibition was taking a large quantity of gas; and whereas he formerly used to send gas into Edinburgh, they were now sending it into his district. The Lord Provost said he did not know if it was true or not, but it was stated that the gas did not give so much light now as formerly; and so people might burn more. Bailie Archibald said he thought there was a want of pressure. He noticed that when the shops were lighted, the pressure went down. Bailie Turnbull confirmed this with respect to the Newington district. Bailie Garland said this was an old fault of the Edinburgh Company. Mr. Bryden said he noticed that during the time of the Company the gas went down very regularly at twelve o'clock at night; but since the supply had been in the hands of the Commissioners, he might say it was always down. The light was very unsatisfactory; and he had had many complaints on the subject from a large number of people. Bailie Archibald said they knew it was better to burn gas at a low than at a high pressure, both for the Commissioners, and the consumers. Mr. Kinloch Anderson asked if it was not the case that the mains were in many instances not large enough now for the quantity of gas required. In Newington, for example, there was quite a new town, and the pipes had not been enlarged. He thought they should have a report from the Engineers on this question. Mr. Linton explained that the whole of the pipes were in course of being re-arranged, so as to afford an adequate supply of gas in all the districts. The Lord Provost asked if it was not possible to put on greater pressure. Mr. Linton replied that it was; but that it was not desirable, because it meant putting pressure where it was not wanted. He said it was better to enlarge the pipes. The Commissioners decided not to do anything until the re-arrangement of the pipes had been effected.

On the subject of a request by the works' employees for holidays, it was reported that instructions had been given to the Engineers to allow the permanent men in the carbonizing department three days' holidays during the summer, at such times as might be approved; and that the out-door men might be away for two days during the general holidays. The Clerk intimated that the Edinburgh employees had written to thank the Commissioners for their concession.

The Finance Committee reported that they had resumed consideration of the proof balance-sheet, together with the Engineers' estimates of the increased cost of producing gas for the current year, and they recommended: "(1) That the surplus of £14,916 15s. 7d. should be carried to the credit of this year's accounts; (2) believing that these investments are authorized by the Commissioners' Act of Parliament, that this year's contributions to the sinking funds should be lent to the Water of Leith Purification and Sewerage Commissioners on debenture at 3½ per cent.; (3) that the price of gas should be raised during the current year by 3d. per 1000 cubic feet to ordinary consumers and for public lighting."

Mr. KINLOCH ANDERSON pointed out that the letters of the Engineers were not given in the minutes, as he understood they were to be.

The CLERK read the letters. Mr. Mitchell wrote that he estimated the increase in the cost of gas manufactured at the Edinburgh works at about £19,000; that this sum included the increase in the cost of pipes, meters, materials, wages, &c.; and that the increased value of residual products was taken into account. Mr. Linton wrote that the increase at Leith would probably amount to about £9500, of which something like £8000 would be for coal (after allowing for the increased value of residual products), and about £1500 would be for meters, pipes, materials, and wages. An advance in wages at the Leith works took place in November last, and therefore the interval till November next would show an increase of wages over the same period of last year.

Mr. KINLOCH ANDERSON, referring to the abstract of the accounts, said they would have had more information if the quantity of gas sold had been stated. They were informed what was received for gas; if they had been told how much gas was sold, it would have been a mere matter of calculation to find out what the increased cost per 1000 cubic feet would be.

Bailie ARCHIBALD thought it would be well for consumers to have some information as to the real cause of the proposed advance of 3d. per 1000 cubic feet in the price of gas. The increased cost of coal, taken by itself, as compared with last year, was nearly £30,000, which was equal to, as nearly as possible, 6½d. per 1000 cubic feet of gas sold. The Commissioners only asked for 3d. per 1000 feet, which meant limited profits. So far as they could make out, it would come to somewhat as follows: They proposed to carry to the next account the sum of £14,916—the surplus profit of the past year, after setting aside the sums required for the sinking funds. Then, assuming that their profits would be the same as last year, they would have a profit of £19,500; adding 3d. per 1000 cubic feet (for each penny per 1000 feet they expected to yield £4680), they would have another £14,000. They would thus stand at the end of the year something like this: They would have about £48,456; but then coal would require £30,000 of it, and they would have to provide £8504 for the sinking funds, which would leave them at the end of the year with a surplus of £9952—say, in round numbers, £10,000—as against the £14,916 they were carrying forward this year. That was to say, they would trench upon their last year's profits to the amount of about £5000. They could do no more than that. They hoped the price of coal would go back; but if it did not, there was no doubt that the charge for gas would have to go up another penny at least.

Mr. MACDOUGALD regretted exceedingly that they should be in a position to require to raise the price of the gas.

Mr. COLSTON: So do we all.

Mr. MACDOUGALD thought that, when they had so large a consumption of gas, they might have had a comparison with such places as Glasgow, Paisley, and Hawick. Then they should have taken into account that if they increased the price of gas, they could scarcely expect that so great a quantity would be consumed in gas-stoves. In the places mentioned, coal was not any cheaper than in Edinburgh; and why they should have gas there cheaper, but equally good, he did not know. They should consider what effect this step would have in the city in regard to electricity. To his mind, it was just affording other parties an opportunity of making an extra effort to keep in with the people. He would like very much if the Finance Committee would take the matter back for further consideration and give the Commissioners some of the information which Bailie Archibald himself had said they ought to have.

Mr. COLSTON said the question was one of demand and supply. They must pay more for gas when coal was dearer, because if the materials out of which an article was made rose in price, the article itself must rise in proportion. Mr. Macdougald told them that they should have made inquiries about the price of gas in Glasgow and other places; yet he himself did not tell them anything about these places, although he seemed to be well informed as to them. A man should surely manage his own business, not according to the state of business of other people, but to the actual state of the finances of his own; and therefore he thought, on the whole, they had had from Mr. Macdougald a speech out of which no one would make much.

Bailie ARCHIBALD moved the approval of the report of the Finance Committee.

Bailie TURNBULL seconded the motion.

Mr. MACDOUGALD moved disapproval of the report; but his amendment was not seconded, and Bailie Archibald's motion was adopted—Mr. Macdougald dissenting.

The accounts for the past year were then approved without further remark.

Mr. Woodrow Thomson, C.A., was re-elected Auditor; and a letter by him, requesting that his fee should be increased on account of the extra work he now had, was sent to the Finance Committee for consideration.

Mr. KINLOCH ANDERSON moved that it be remitted to the Finance Committee to consider and report as to the relative salaries of the Engineers to the Commission; and the motion was agreed to.

The Commissioners then adjourned till September.

SOME NOTES FROM LEEDS.

From A Correspondent.

LEEDS, *Saturday*.

Since I wrote you last week, I have had an important interview with Mr. James Lupton, the Secretary of the Leeds Gas Committee. It was not altogether sought-for on my part, because I felt that I was on a tender mission; and I knew I should "tread on somebody's corns." However, it came about in this way. During my perambulation of the town last week, as reported in the JOURNAL, I was being constantly told by representatives of the gas trade in Leeds, that the Gas Committee would all be turned out when the proper time arrived. Moreover, it was freely asserted that had there been a Chief Gas Engineer in Leeds, who would have had supreme control of the arrangements for importing the new stokers in the place of those on strike, such an unfortunate *mêlée* would never have occurred. In fact, there seemed to be a general idea that, had there been a second George Livesey in Leeds, things would have been different. A very influential man in Leeds was so exasperated over the failure of the Gas Committee, that he even asserted that the members of the Leeds Corporation were divided amongst themselves as to the advisability of having a Chief Gas Manager over the heads of the three Station Managers now in office. I admit that this matter set me thinking seriously; and when I told my informant that I rather doubted it, he promptly rejoined: "Will you go and see Mr. ——, and Mr. ——, of the Leeds Corporation, and hear what they say?" Well, I considered the matter; and although I knew that the gas strikers' *fiasco* was alleged to be due to the mismanagement of the Chief Constable of Leeds, I thought that probably a Chief Engineer would avert a repetition of such scenes in the town, and the compensation which the Council will have to pay. I therefore said to myself: I will go to head-quarters, and interview Mr. Gilston, the Chairman of the Gas Committee, and tell him frankly that there is a public desire for a Chief Gas Manager, and then learn his views. I made my way to the Leeds Municipal Offices, and asked when Mr. Gilston generally attended there. The card of the JOURNAL was taken in to Mr. Lupton, and I was ushered into the secretarial *sanctum*. I acknowledge I felt rather peculiarly situated, because, as a matter of fact, the Secretary was the chief of the Gas Department. I frankly stated that I desired to meet Mr. Gilston *re* the recent gas strike. "Yes," said Mr. Lupton; "but if there's any information you require, I can give it you. I told you," he continued, "when I saw you at Meadow Lane last week, that the failure was due to the mismanagement of the Chief Constable, and not to the Gas Committee." "Well," I replied, "it is not altogether about the gas strike that I want to see Mr. Gilston. It is to know how such things are to be avoided in the future." Mr. Lupton said the arrangements of the Gas Committee could not be more complete; for as the strikers walked out, the new men ought to have come in. "Yes," I replied; "but you will pardon me, Mr. Lupton. What things *ought* to be and what they are, are two different things. Now, Mr. Lupton"—here I felt on tender ground—"I am going to tell Mr. Gilston that there is a public desire for the appointments

of a Chief Manager, and to ask his views." Here Mr. Lupton turned and looked very straight. Said he: "This desire of yours to see Mr. Gilston is most unwarrantable. There is no need for a Chief Engineer. Since there have been three Engineers at the three works, we have made great improvement; and the figures will show it. Again, it is through the press of Leeds that the deplorable rioting took place; and now the JOURNAL OF GAS LIGHTING, it appears to me, wants to stir up further strife." "Not at all," said I; "it is quite the reverse. The JOURNAL, as you ought to know, Mr. Lupton, is the advocate of good management, order, discipline, and fair remuneration, and is altogether published in the interests of the gas trade." "Yes," said Mr. Lupton, "but the JOURNAL has no right to go into matters that do not concern it; and I consider this most unwarrantable." "Very well," I replied; I can only say, speaking personally, that this matter is of vital interest to corporations in general. Leeds is not the only place where they have not a Chief Engineer. If the Leeds Corporation think that it would be better to have one, then their decision will probably affect other corporations; and so it is the business of the JOURNAL OF GAS LIGHTING to know what the views of the Council are." Mr. Lupton said, "I consider the Press a great nuisance; but if you like to see Mr. Gilston you can do so, although I do not think you will get anything out of him." On hearing this, I promised Mr. Lupton not to trouble any further in the matter; and so the interview ended.

THE RECENT STRIKE AT LEEDS.

The Action of the Executive of the Chamber of Commerce.

The Monthly Meeting of the Council of the Leeds Chamber of Commerce was held last Wednesday, under the presidency of Mr. W. BECKWORTH, who made a statement in reference to the action he and Colonel Harding took in connection with the recent labour dispute between the Gas Committee and their workmen.

Mr. BECKWORTH said that, in accepting the responsibility of interfering in the matter, they felt that they were taking into their hands to a large extent the reputation of the Chamber, and perhaps placing in peril the cause of the Conciliation Board for which the Chamber had been labouring for so many months. Happily, their efforts met with success on the whole; and he thought he might have the satisfaction of feeling that, at any rate, the reputation of the Chamber had not suffered, but that, on the other hand, the cause of conciliation, which they had been seeking to establish, had been advanced. When they succeeded in bringing together an equal number of the workmen and the Gas Committee, it was found possible to come to a common understanding. With regard to the nature of this understanding, he thought he might say, on behalf of Colonel Harding and himself, that the agreement was not a surrender on either side, but a reasonable and honourable compromise on all questions in dispute. He had only one other reference to make to the matter. In a discussion which took place in the Council, the Chairman of the Gas Committee stated that "if Mr. Beckworth had acted as he had suggested on June 14, and sought to have brought about a conciliation, the whole of the turmoil might have been spared the town." And there were others who stated that the Chamber of Commerce had declined to have anything to do with the matter. All he knew about it was this: On June 14 he received a note from the Chairman of the Gas Committee, in which Mr. Gilston said, as he supposed they were going to form a Board of Arbitration, would it not be well to begin with the gas workers' dispute? He (Mr. Beckworth) wrote him at once to say that the Board of Conciliation was only as yet a proposal, and did not exist, and could not exist for some time. Further, that when it did come into operation, it certainly would have cognizance of such disputes as the one between the Committee and their workmen. But he added, with regard to this particular case, that he was sorry to say that the Gas Workers' Union, although they attended the first conference, had definitely decided to have nothing to do with the Board of Conciliation. This was the only communication that passed between the Gas Committee and the Chamber on the subject. He could quite believe that if a Board of Conciliation had existed in the town, and had secured the confidence of all concerned, it would have been possible to have brought the dispute within its purview before it reached the extreme it did ultimately. But the Gas Committee, through their Chairman, was warned that such a Board did not exist, and could not be hurried into existence for this particular purpose. He could quite understand that noboby liked to bear the blame for the disgraceful scenes which had attended the strike or lock-out, and which had certainly stained the honour of the town. They all hoped that the experience the town had gone through would show how undesirable it was to resort to strikes or lock-outs in connection with questions in dispute, and that it was very much better to refer the matters to a Conciliation Board, such as the one they hoped would soon be in operation in Leeds.

Subsequently it was announced that the Board of Conciliation would be constituted of 24 members—half masters and half workmen.

In reply to a question, the CHAIRMAN said that, after what recently took place, the Gas Workers' and General Labourers' Union had quite changed their view with regard to the Board of Conciliation; and he believed they were perfectly willing to join the Board. This was, he thought, one admirable result of the course taken. They might leave it to the Board to make provision for the reception of the gas workers' representatives.

A vote of thanks was afterwards accorded to Mr. Beckworth and Colonel Harding for the part they took in settling the dispute between the Gas Committee and their workmen.

Knaresborough and the Bradford Water Bill.—The Chairman of the Knaresborough Improvement Commissioners, referring at the last meeting to the result of the opposition in the House of Commons to the Bradford Water Bill, expressed the opinion that it was much more favourable to the Commissioners than the decision in the House of Lords, in their having obtained a continuous flow of water and an increased voting power on the Committee of Management. Seeing that the interests of the Commissioners were identical with those of the city of York, the additional votes, he said, would be of considerable importance, aided as they would be by the County Council.

THE STREET-LAMP REGULATOR QUESTION AT SHEERNESS.

The dispute which has arisen between the Sheerness Local Board and the Sheppy Gas Company, in regard to the removal of the regulators from some of the public lamps, to which reference has recently been made in our columns, is unfortunately not very near an amicable settlement. We stated last week that the Board had passed a resolution expressing their intention to insist on an apology being made by the Directors of the Company for insinuating that the removal of the regulators, by which it was asserted that 25 per cent. more gas had been paid for than had been consumed, had been effected in some questionable way. Notwithstanding this resolution, the Directors are not disposed to apologize. They are, however, not unwilling to arrange peaceably the various questions which have arisen. But before attempting to do so, they think these matters should be fully and fairly stated; and this they have done in a long letter addressed to the Local Board by their Secretary (Mr. A. W. Marks). The effect of this letter has been rather the reverse of what was intended; for on its receipt the Board resolved not to read it, and to "decline further communication" from the Directors until they made a full and unreserved apology. Such is the present position of affairs; but as both the Board and Directors have now adjourned for a month, and the letter has been published in a local paper, it is to be hoped that it will not go unperused—of course, unofficially—by the ratepayers' representatives, and that when they re-assemble a more conciliatory feeling will animate them. Whatever sharp expressions the Directors may have been guilty of employing, they are excusable on the ground of natural irritation at the insinuation by the Surveyor of the Local Board, in his first report, of dishonest practices on the part of somebody acting in the Company's interest. The Surveyor had the confidence and support of the Board, as was shown by a public declaration to this effect; and, without condescending to consult the Directors on the matter, or allowing them a chance of explaining, a reward was offered with the view of bringing the guilty party to light. It is scarcely to be wondered at that the Directors were annoyed at such conduct. They questioned the right of the Board, or any of their servants, to interfere with the lamp-regulators; and Mr. W. H. Michael, Q.C., has borne them out in this matter. He says the Board have no such right, although they may demand an inspection at any time in the presence of the Company's servants or agents. He considers that it would be wise for the Board and the Directors to arrange for a joint periodical examination of the regulators. If the Board are willing to agree to this, and to withdraw the implied charges which they have made, the Directors will gladly facilitate any practicable method of avoiding similar differences in the future. It seems to be pretty clear, from the Secretary's letter, that the Board, or rather their servants, have not quite understood the principle upon which the regulators (of which they have assumed full control) are constructed, or their mode of operation. Hence defects have been alleged which five minutes' explanation from the proper person would have accounted for and removed. The whole matter would then have been cleared of mystery; and the annoyance imparted into the dispute, from the absence of such explanation, would have been avoided. We cannot here go into all the details, which are ably set forth and dealt with by Mr. Marks; but a hope may be expressed that the result of his efforts on behalf of his Company will be a better understanding in the future. The average meter system, involving, as it does, divided management of the public lighting, is liable to give rise to dissatisfaction; but it might be made to work better than it appears to do in Sheerness if the Local Board would only adopt certain practical suggestions which have been made by the Gas Company's Engineer and Manager (Mr. W. T. Carpenter). But while suspicion and officious interference, coupled with insinuations of unfair dealing, are the order of the day, it is almost too much to expect that reasonable advice will have much consideration.

THE ELECTRIC LIGHTING QUESTION AT BARNSLEY.

Adoption of the Westinghouse Company's Tender.

A Special Meeting of the Barnsley Town Council was held last Tuesday—the MAYOR (Mr. Alderman Wood) presiding—to further consider the question of electric lighting, which had been before the Council on a previous occasion, as reported in the JOURNAL for the 22nd ult., on the report of the Park and Lighting Committee, recommending the acceptance of the tender of the Westinghouse Electric Lighting Company for lighting the inner area of the town for the sum of £17,800.

The MAYOR having re-introduced the subject,

Mr. RALEY, who moved the adjournment at the last meeting, resumed the discussion. He said they were told that if they waited for five years they would get an installation at half the cost now proposed to be incurred; but he believed that if they lived a thousand years longer, electricity would not be perfection. They could not wait five years, and must look at the terms of their Provisional Order, which stated that they must supply electricity within two years. It would take them twelve months to put down the plant; and if they delayed the question, a private company would step in, and Parliament would, he thought, be justified in granting them powers. The public meeting—which was a representative one—had demanded the light; and in a subsequent ward meeting, at which they had the benefit of Mr. Woodcock's advocacy on the other side, the desire was almost unanimous for electric lighting. Under the Provisional Order, which was for the supply of the inner area, they were bound to supply the outer area on certain terms; and he should not vote for it were it not understood that if the inner area were successful, the lighting would be extended to the whole town. This would entail a little more expenditure in extending to the entire borough, but the buildings were double the size required. The only extra cost would be for coal, oil, waste, &c. It had been stated that 2500 10-candle power lights would cost as much as

5000; but he held that 10,000 lights could be produced at the same cost as 5000. Then there was the financial question. He relied upon Mr. Bromley Holmes's estimate, which appeared to have been cautiously prepared. With regard to private lighting, he believed that the estimate of the Committee of 5000 10-candle power lamps was excessive. The lighting of the markets was not calculated for. He believed there were sufficient numbers of private individuals, chapels, churches, and hotels who would take the light; and he thought the number would be raised to 5000 in a few years' time. When the light had been thoroughly tried, they would have 7500 or 10,000 lights. Every ratepayer would be a shareholder in the concern; but every light taken would be reducing the cost. He should vote for having the light because the ratepayers demanded it, and therefore would take it; and in a short time he believed it would not be any burden at all upon the rates.

Alderman TYAS contended that the introduction of the electric light was premature. He believed there were yet great improvements to be made in electric lighting; and therefore it would be advisable not to plunge the town into expense at present. He therefore moved an amendment to the effect that, inasmuch as improvements in the electric light were being constantly discovered, the Council ought not to accept the tender of the Westinghouse Electric Company. He further submitted that the scheme before them was incomplete.

Alderman MARSDEN seconded the amendment. He said he doubted if the scheme could be carried out for the amount stated; and believed that if they escaped with an expenditure of £30,000, they would get off very well. He thought it would be better to let the thing rest awhile, and see if they could not approach the Gas Company and buy the concern. He would have a valuer on either side, and have the price settled by an umpire. Then, if the Company would not sell, let the Council go in for compulsory powers for buying the works. The electric light was being tried at Barnet, and it was found to be unsatisfactory. It was tried at Leamington, and was unsatisfactory there. Taunton, he believed, was the only place where it was right; and there it was supplied by a private company. It was tried at Chesterfield by the Corporation, and failed; and after a certain time they had to go to the Gas Company and ask them to supply them with gas. He should not like to see their Corporation in this position. He believed that if they approached the Gas Company in a proper businesslike manner they would have no difficulty in purchasing their undertaking.

Mr. BAILEY remarked that he could understand people being satisfied with gas at 1s. 9d. or 2s. 1d. per 1000 cubic feet. If the electric light could be supplied by meter at about 5d. or 6d. per unit, it would no doubt be practically the price of gas. He had been through his gas bills, and found he had 36 gas-lights, which cost him 9s. per light per annum. He calculated the time they burnt, and the average was 440 or 450 hours. In the report, Mr. Holmes assumed the electric lamps would burn 800 hours for 16s. If they could be burnt 440 hours at half the price, it would be 8s. or 8s. 6d. At Newcastle, they were told the electric light was 40 per cent. dearer than gas. Gas there was only 1s. 9d. per 1000 cubic feet; and 40 per cent. on 1s. 9d. did not reach 3s. 4d., the price charged at Barnsley.

Mr. WADDINGTON criticized the speech of Mr. Woodcock at the ward meeting, and characterized it as romantic. He said Mr. Woodcock reduced the income for private lighting 50 per cent., but used the same figures with regard to the cost of production for lighting 2500 lamps as 5000. If they reduced the number of lamps from 5000 to 2500, they would save £1000 yearly in the course of production. He contended that if he could show mistakes with respect to four or five items, his whole case was not to be depended upon. Then Alderman Marsden had said if they adopted the electric light, it would add 1s. in the pound to their rates. Now, 1s. in the pound on the rateable value was £4000; so that if they lost all they proposed, it would not be much more. They had expended £500 in getting a Provisional Order, and in other expenses; and he thought they ought to hold on to the scheme.

Alderman BLACKBURN read two letters he had received since the previous meeting. The first was from the Westinghouse Company, the Secretary of which said he understood that no objection to the electric lighting system for Barnsley was raised because it only covered what was known as the inner area; leaving the outer area to be lighted with gas. The system provided by them could, he said, be easily extended to the outer district at any time, with the simple addition of boilers, &c., and could be supplied at a cost not exceeding that paid for gas. The letter pointed out that the buildings would be erected; and the whole of the extra cost would consist of the outlay for fuel and wages of one or two men. The Company manufactured their own meters, which could be purchased at about the price paid for gas-meters. Alderman Blackburn explained that he wrote to Mr. Holmes, asking him to come over to Barnsley that day. He, however, could not attend, but had written a letter to him, in which he said he had seen the Borough Surveyor, and had given him his views with respect to working expenses. He considered that with a Provisional Order from the Board of Trade, assuming that Barnsley wanted electric lighting, the Barnsley undertaking had a satisfactory and prosperous future before it.

The MAYOR said he was a long time before he could decide to vote for the electric light. He thought, in the first place, they had not made an honest attempt to purchase the gas-works; then he believed the electric light could not be supplied at the same price as gas; and in the third place he asked himself the question whether or not the ratepayers would be willing to pay for it. He had had some conversation with certain persons as to purchasing the gas-works; and he now felt perfectly free on that point. As to the extra cost, he found the people were quite willing to be taxed to have the electric light; so that he could vote for it. He believed the facts and estimates given by the Committee were true; and he knew that the Company they were dealing with had undertaken to put down a plant for a given sum, and work it for three months. Further, he thought the estimate for working expenses was ample; and this being so, he should vote for the adoption of the Committee's minutes.

A vote was then taken, when the amendment was lost by 5 votes to 15. The Committee's recommendation was therefore adopted; and the work will, it is understood, be proceeded with at once.

THE LONDON VESTRIES AND THE WATER QUESTION.

Another Conference of Delegates.

The delegates of the Metropolitan Vestries and District Boards assembled again at the St. James's Vestry Hall, Piccadilly, last Thursday, to further confer on the subject of placing the water supply of the Metropolis in the hands of some central authority—a subject which had been considered by them at a meeting held on the 19th of June last, as reported in the JOURNAL at the time (see Vol. LV., p. 1196). Mr. J. BONTHRON (St. James's) presided; and there was a good representative attendance.

The CHAIRMAN, in opening the proceedings, said that, so far as the principle of the purchase of the Water Companies' undertakings was concerned, they were all agreed thereon, as well as on the principle that there should be some municipal authority to control the supply. The President of the Local Government Board (Mr. Ritchie), as far as he could be the mouthpiece of the Government, had affirmed this principle. There was an inquiry going on at the Guildhall with regard to the City; and he was sorry to hear that the City authorities were inimical to the procedure of the Vestries, and wished to stand aloof. Nevertheless, seeing that they were agreed on the principle that the water supply of the Metropolis should be in the hands of the ratepayers, whatever body opposed them would only sharpen their sense of duty, and cause them to make it more clear to the inhabitants of London that it was their duty to secure the control of their own water supply. The delegates had each had a copy of a case submitted to Counsel 32 years ago on the supply of gas; the question put being when an inquiry constituted a legitimate subject for the expenditure of money by Vestries and District Boards, and whether they were justified in levying a rate to meet such expense. There would be submitted to the meeting a motion that Counsel's opinion be taken whether, under the Metropolis Local Management Act, the Vestries had the power to spend money on the question of the water supply. To his mind, it would be a very strange thing indeed if the Metropolis had not the power to take such action, which was possessed by every community and city in England.

Mr. J. BEAL moved the first resolution—"That as the London County Council has no power to introduce a Bill into Parliament for the purchase of Water Companies' undertakings, the Vestries and District Boards represented at this conference be advised (following the precedent successfully set in the case of Metropolis gas legislation) to unite in giving notice of, and preparing a Bill for, such purchase." He said the City authorities were opposing the water inquiry clause of the London Council Bill; and he thought the Vestries could not count upon any assistance in that direction. So far as the inquiry instituted by the Corporation was concerned, the Vestries had taken no part in it, although they offered to share the work and make themselves a Joint Committee for all London. The City invited them simply to attend as witnesses, and not take any other part in the inquiry. All they had seen had been opposition. The resolution he had to propose was the most important that had ever been submitted to a body of London delegates. The basis of it was what was done in 1868 in connection with the great gas inquiry. The clause under which they proposed to act was the 92nd of the Metropolis Local Management Act. He wanted the delegates to know that, having put in force the powers they possessed under that clause, the price of gas, which was then 4s. 6d., and in some parts of London 6s. per 1000 cubic feet, was less than 3s., which meant a saving of £50,000 a year to the ratepayers of the Metropolis. In the case of water, it meant a saving of 1½ millions per annum. The London County Council had no power, under the Act of 1888, to deal with this great question; and therefore they had asked Parliament to give them authority to hold an inquiry. But he wished to go further—to look the whole matter in the face, and introduce a Bill to sanction the purchase of the undertakings of the Water Companies in the interest of the whole of London. Lord Cross did the same thing in 1880; and he did it on the basis of valuation with a view to large compensation for the supposed interests. The Bill, however, was defeated. The Committee of the House of Commons in 1887 said there was no foundation for the charge that they were trying to confiscate property. There were vested interests, and such interests must be honourably recognized and paid for. The step to be taken that day was in the direction of saying to the Companies, "We will buy you on fair terms." In the London County Council they would have met with a good spirit—a better could not prevail in any public body; and the Chairman of the New River Company had said the basis was perfectly unexceptionable. Mr. Ritchie, when the Vestries were before him, affirmed the principle, and said they were the only terms the Government would support.

A DELEGATE remarked that this was not so—that Mr. Ritchie said it appeared to him that those were the proper terms. This was his personal opinion.

Mr. BEAL said Mr. Ritchie mentioned that the Government would support them. He (the speaker) wished the matter taken up at once, in order to save a year's time. They could give notice of the Bill, and deposit it in November next; and Sir T. Farrer said it would be passed by April, 1891, before the next quinquennial valuation.

Mr. LAYMAN (St. George's-in-the-East) seconded the motion.

Mr. N. HUGGETT (Kensington) moved, as an amendment, to leave out the words relating to the London County Council. He said he thought there should be a representative body; but it was practically the same thing whether it should be the County Council or the Vestries and District Boards represented at the conference who should introduce a Bill into Parliament.

This amendment was not seconded.

Mr. G. MARGERISON (Marylebone) moved, as a further amendment—"That, as the London County Council have now a Bill before Parliament to obtain authority to inquire into the water supply of London, and as inquiry is also going on at the Guildhall on the same subject, a Standing Committee be formed to watch the progress of these inquiries; to consider any matter relating to water supply; and to report, when desirable, to this or any future conference." He said he thought the Vestries were trying to "rush" this matter. As they did not convince Mr. Ritchie, they became a little petulant, and

thought they would take the concern into their own hands. They had passed certain resolutions at a time when they well knew the London County Council had no power to introduce a Bill to Parliament; and when they had already taken action, and left it to Mr. Ritchie to ask the Government to introduce a Bill to enable the Council to purchase the water undertakings and give the consumers an independent supply, it seemed to him that they ought not to go back from that position. It would only be courteous to the Council to leave it in their hands, as they were asking for power to spend money on an inquiry. The Council were wholly with them on the principle that the water supply should be administered by a public body in the interest of the ratepayers; and there was no reason why they should rush the matter after it had been so long in abeyance. The course indicated in his amendment, he considered would be the wisest and most dignified.

Mr. S. P. TAYLOR (Marylebone) seconded the amendment.

Mr. G. W. IRONS (Chelsea) said if the Committee were to have any weight at all, it should be composed as suggested by the third resolution—one representative from each Vestry. The Guildhall inquiry was a very one-sided affair, because the Water Companies had refused to take any part in it. The resolutions on the paper were consequential and logical; and the delegates could not take a better step than was suggested by these resolutions.

Mr. LAYMAN said if they referred the matter to a Standing Committee, they would, twelve months hence, be in the same position as now. He advised that the Vestries should vote £10 apiece for preliminary expenses. This would show to the public that there was a body going to deal with the matter.

Mr. T. H. BOLTON, M.P. (North St. Pancras), said he felt it was very desirable the Vestries should move in this matter, as they were really the only bodies who could take practical action until Parliament gave authority to the London County Council to do so. The amendment would lead to the matter being delayed. The Vestries ought to have no hesitation or delicacy in promoting the measure, and bringing pressure to bear upon the Government. The Vestries would see the propriety of providing the money; and the parishioners would be only too glad to support them. The £10 per Vestry would not be enough to carry the Bill; but it would be sufficient to initiate the proceedings.

Mr. J. W. WHITER (Hackney) thought the delegates ought to recognize the fact that, for the proposed Bill, they would require £8000 or £9000. At the same time, whatever the expense might be, his opinion was that the ultimate good of the Metropolis at large should be considered.

Mr. J. ROWLANDS, M.P. (East Finsbury), pointed out that the Water Companies had no monopoly of the supply of water. Sir W. Harcourt had said that an independent supply could be brought to London. He did not suppose this would ever be done; but the authorities had a moral and a legal power to do it. He objected to the resolution being passed as it stood, on account of the recommendation that they were to introduce a Bill for the purchase of the Companies' undertakings.

Mr. O. V. MORGAN, M.P. (Battersea), thought they would be wise to approach the Water Companies in a friendly spirit; they would do themselves no good by rushing into this matter in a spirit of hostility. He was in favour of making the very best bargain possible with the Companies; and that was one of his objects in introducing his Bill to bring in a fresh supply—a Bill which he did not suppose would be passed by the present Parliament. If they met the Companies in a friendly way, the Companies would show the same spirit. If they were attacked, they would set up their backs, and in the end the public would have to pay for it.

Mr. D. NOEL (Shoreditch) was surprised at the talk about a "friendly spirit" and hostility. His experience of the Water Companies was not that they were so gentle as to induce him to be friendly with them. He advised the Vestries to go on.

Mr. T. N. SOUTTER (Bermondsey) did not see how he could support the resolution, as his parish had passed an opposite motion.

Mr. HAMILTON proposed an adjournment of the meeting, to ascertain the feelings of the ratepayers. He said that at present they did not appreciate the strong feeling of the ratepayers against the Water Companies.

Mr. J. TRENNER (Holborn) suggested that Mr. Beal should accept an addition, at the end of his resolution, of the words "or for power to create a competing supply."

Mr. BEAL said he would accept these words. They could not carry a Bill for a competing supply until they persuaded Parliament that they had used and exhausted every effort to purchase. Parliament would not allow vested interests to be interfered with. He advised the meeting to pass the resolution as a step forward—one which would in a few months bear fruit in the interest of the public. The £10 from each Vestry would produce £130 or £140, and would enable them to give notice of a Bill. They would then have to lodge a petition. Parliament could not oppose them; and the Government could not. He adopted this course with regard to the gas question; and the City of London Gas Act was passed. He had the same plan in his mind now.

The amendment was then put; but only two delegates voted for it.

Mr. SOUTTER moved, as an amendment, to substitute for the last four words of the resolution the words, "empowering the London County Council to create a competing supply."

The amendment, however, was lost; and the resolution, with Mr. Trenner's addition, was carried.

Mr. BEAL next moved, and Mr. MILLER seconded, the following resolution—"That each Vestry and District Board be asked to contribute the sum of £10, under the 92nd section of the Metropolis Local Management Act, 1855, towards the preliminary expenses, such as service of notices, advertising, and drafting and depositing a Bill for the purchase of the Water Companies' undertakings.

The motion was carried without discussion.

Mr. BEAL then moved the third resolution—"That a Committee, consisting of one representative from each Vestry and District Board taking part in this conference, be appointed to prepare notices for a Water-Works Purchase Bill, and a Draft Bill, and to take such other steps as may be necessary for promoting the Bill."

Mr. HUGGETT thought it inequitable that a representative should be appointed for each Vestry. The rateable value of St. George's parish was £188,000; and that of Kensington, £1,900,000. He would suggest one representative for every £400,000; otherwise property would be in no way represented.

No action was taken on this suggestion; and the motion was carried.

Mr. BEAL proposed that a new case should be laid before Counsel as to the power, under the section of the Metropolis Local Management Act already cited, of Vestries and District Boards to spend money on inquiries in the interest of the ratepayers.

This was carried; and a Committee was appointed to confer with Mr. H. Wilkins, the Vestry Clerk of St. James's (the Clerk of the Conference), in the preparation of the case.

A vote of thanks to the Chairman closed the proceedings.

BRADFORD CORPORATION WATER SUPPLY.

The Opposition to the Nidd Scheme Settled.

In the JOURNAL for May 6 last (p. 840), we reported the proceedings before a Select Committee of the House of Lords on the Bill promoted by the Bradford Corporation to enable them to carry out an extensive scheme for the improvement of the water supply of the borough at an estimated cost of £1,255,000. The project—known as the Nidd scheme—was opposed by the Knaresborough Local Board, the York City Council, and the York New Water-Works Company, who contended that they would be prejudicially affected thereby. Eventually the Bill was passed on two conditions: (1) That if at any time the Corporation should take more than 17 million gallons of water per day from the Nidd area, they should give corresponding additional compensation; (2) That what was known as the "Manchester clause" should apply to Knaresborough. This clause specified that after the works proposed by the Bill had been completed, any corporation, authority, or company should be at liberty to have a supply of water from them, subject to such payment as might be agreed upon, or, in default of agreement, a sum equal to 4 per cent. upon such proportion of the total capital expended as the daily quantity of water demanded might bear to the total daily quantity taken from the Nidd into the Bradford supply, together with a proportion of the cost of management and maintenance. It was also provided that the Bradford Corporation should not be compelled to give such supply so long as there might not be left for the inhabitants of the borough a sufficient quantity of water to furnish 25 gallons per head per day. The Bill, as amended, duly came down to the House of Commons, where the opposition was renewed; and the whole matter has lately been investigated *de novo* by a Select Committee presided over by Mr. J. Stansfeld—the inquiry extending over several days. It is unnecessary to repeat the evidence on the general scope of the Bill, which has already been given; and the other questions which occupied the attention of the Committee are dealt with in the following condensed report of the proceedings.

The case for the promoters was opened by Mr. Balfour Browne, Q.C., who explained that the Corporation had already spent £2,250,000 on their water-works, which had gradually become inadequate to meeting the increased demand upon them. The consumption of water in 1877 was 1013 million gallons inside the borough, and 339 million gallons outside; in 1889 it had risen to 1706 millions inside, and 510 millions outside. The Corporation therefore decided on seeking a fresh source of supply; and ultimately they turned their attention to the Nidd, which they considered to be the best one possible. The necessity for an increase was shown by the fact that they required 13 million gallons of water to meet the daily requirements of their customers, whereas they only had about 10½ million gallons to give them. The entire drainage area of the Nidd was 135,000 acres, of which they proposed to take 18,200 acres; and they were prepared to give compensation on a very liberal scale. On an area of 9900 acres they proposed to construct the Gouthwaite reservoir, which would be entirely for compensation purposes, and would contain 1510 million gallons of water. The total cost of the scheme was £1,255,000; one part of the heavy work being the construction of a tunnel under the River Wharfe and the Nidd grounds, about four miles in length. This reservoir would be built at once; but the other four comprised in the scheme would only be taken in hand as occasion required. The last one might possibly not be for 20 years. The West Riding County Council, who opposed, wanted a constant supply; but this could not be given, as the water coming down was intermittent, and in dry weather was a mere trickle. There were about 30 mill-owners on the stream, who said they must oppose unless they were protected by clauses; and these had been arranged. Mr. A. R. Binnie, M. Inst. C.E., Chief Engineer of the London County Council, and formerly Water Engineer of the Bradford Corporation, then explained the nature of the scheme; and, after some discussion, the Chairman said the Committee were of opinion that the necessity for an additional supply of water being provided for Bradford had been proved to their satisfaction.

On the following day, Mr. C. Gott, Dr. C. Meymott Tidy, Dr. Odling, Professor Symons, Mr. T. Hawksley, and Mr. H. Hill, were called in support of the Bill. Dr. Tidy combated certain objections raised as to the quality of the water; declaring it to be excellent for both trade and domestic purposes. He denied that under the scheme inferior water would be given for compensation purposes. The water was practically all alike; but, if anything, the compensation water was a little the better. It would manifestly improve the water if a large compensation reservoir were constructed, such as that proposed at Gouthwaite. If any peaty water went into the reservoir, within three or four days the peat in it would subside; while the action of light would bleach the water. The Nidd Valley generally, and Knaresborough in particular, would, he thought, be considerably benefited by receiving the water from that reservoir. Dr. Odling confirmed Dr. Tidy's evidence. Professor Symons stated that the average rainfall on the area appropriated by the Corporation was 56 inches; and on the compensation area, 53 inches. Mr. Hawksley expressed the opinion that Knaresborough would be much benefited

by the construction of the proposed reservoir, and no possible damage could arise therefrom to the navigation of the Ouse. There was therefore nothing in the contention of the York Corporation that the proposed works would interfere with the scouring properties of the Nidd. Mr. Hawksley's evidence closed the case for the promoters.

On behalf of the Corporation of York, Mr. Cripps explained that the three points in which they were specially interested were those of the navigation of the Ouse, their representation on the Board of Management of the reservoir, and the cleansing of the reservoir from peaty deposits. He contended that the prosperity of York depended upon the navigation of the Ouse; and that this depended upon the condition of the river. By the scouring by the upland fresh water, silt was brought up by the tide; and they had to depend partly upon dredging and partly on the scour in order to keep open the navigation. The scheme before the Committee would take away the mass of the summer floods—12 per cent. of the scouring capacity—and substitute a more even flow. With regard to representation, the millowners had 165 votes; and he did not think that the 32 votes asked for by the Corporation were too many. Dealing with the point of the cleansing of the reservoir, which had been ridiculed by Dr. Tidy and Mr. Hawksley, he said the Corporation thought it was very necessary; and he would like the wording of the clause in Bill to be made more clear. He then called evidence in support of his contentions.

The objections of the Knaresborough Local Board were then laid before the Committee by Mr. Kershaw. He pointed out that Knaresborough raised £600 a year by water-rates and mills, and the Board were under statutory obligations to supply good and pure water to the inhabitants of the town; and so long as they did this, no other body were to go above them unless they gave compensation. The quality of the water was excellent, and the population were healthy—a fact attributable in a great measure to the purity of the water. He maintained that the promoters should tap their aqueduct at some spot, and supply Knaresborough with water at the same price as it now cost Knaresborough to pump their water. The quantity that should be sent down from the compensation reservoir should be 12 million gallons daily; and not 8 millions, as proposed by the Bill. He called Mr. Basil T. Woodd, the Chairman of the Board, who said he regarded the scheme as being extremely injurious to Knaresborough, by reason of the diminution, but more particularly the deterioration of the water. He was quite sure the Improvement Commissioners would be willing to pay the £150 a year which it now cost them to pump their water, for a supply from the conduit proposed by Bradford. As a sanitary authority, his opinion was they should have representation on the Board of Management of the compensation reservoir.

On the following day, the objections of the West Riding County Council and of certain mill-owners were heard. They may be summed up in an application for the provision of a minimum continuous flow of water. After considerable discussion, Mr. Pope, Q.C., on behalf of the promoters, said their idea was that when they had constructed and maintained the reservoir at the necessary capacity, the responsibility of the Corporation was at an end. There might be some authority which would act on the instructions of the Committee; but the Bradford Corporation had nothing to do with sending down the compensation water. After some deliberation with closed doors, the Chairman said the Committee had had considerable discussion on the question of the amount of constant flow which should be secured at the point of the gauge at the outfall of the large reservoir; and had come to the conclusion that 5 million gallons a day would be a sufficient, though not an excessive supply. The Committee had also discussed the question of the constitution of the Board of Management. They thought that others should be represented beside the mill-owners, and they considered this would be a good arrangement: York and Knaresborough to have two representatives, with eight votes to each representative—the votes to Knaresborough being in addition to those to which they were entitled as owners of mills; and that the three riparian owners should be chosen by the County Council instead of by the mill-owners in general. The Committee did not propose to interfere with the voting powers of the mill-owners under the Bill. The riparian owners should have eight votes each. The Committee did not impose upon Bradford the necessity to supply the water. As these conclusions would necessitate considerable alteration in some of the clauses, a few days were allowed for the purpose of adjusting them.

On the resumption of the proceedings, Mr. Pope brought up clauses which, as he contended, carried out the views of the Committee. The first clause provided that the Gouthwaite reservoir should be subject to the control of a Board of Management consisting of millowners on the River Nidd, three riparian proprietors appointed by the West Riding County Council, two persons appointed by the Corporation of York, two by the York New Water-Works Company, and two by the Knaresborough and Tentergate Improvement Commissioners; the persons so appointed being removeable, and the vacancies filled by the bodies appointing this Board—to be called the Nidd Millowners. The second clause provided that, in order that the water of the compensation reservoir should be used and applied as might prove most beneficial, the Board of Management should regulate and control the user of the reservoir and the waters collected therein, for which purpose meetings of the Board should be held from time to time. It was further provided that if the Corporation of Bradford constructed and maintained the compensation reservoir of such dimensions as to be capable of containing 1510 million gallons, this should be taken by the millowners and riparian proprietors as full compensation for the diversion and appropriation of all springs, streams, and water arising and flowing within the appropriated area; and that for all the rights and interests of every millowner or riparian proprietor, the Corporation should not at any time take from the appropriated area a daily quantity of water exceeding 17 million gallons. The Corporation are to construct and maintain, within 200 yards of the foot of the embankment of the compensation reservoir, a gauge by means of which the quantity of water passing over such gauge can be ascertained. They are also from time to time to appoint a proper person as superintendent of the reservoir, with a competent salary, to be paid by them for the protection and management of the reservoir; and his duty will be to regulate the sluices, valves, and other works, and mete out water from the reservoir so as to pass over the weirs in every 24 hours an equal and continuous flow of the minimum quantity of 5 million gallons of water. The Chairman pointed out to Mr. Pope that he had avoided stating the maximum. Mr. Pope said this had not been done under his advice; but the mill-owners desired that it should be left to their discretion. After hearing arguments on behalf of the West Riding County Council, the Committee added the words: "So long as sufficient water remains in the reservoir; and shall comply with the rules for regulating the discharge of water from the compensation reservoir which may be made by the Nidd Reservoir Board"—substituting the latter words for "the Nidd Mill-owners" throughout the Bill. Mr. Pope next put before the Committee certain minor amendments; and the Committee then went through the other clauses of the Bill, and passed them. As the Bill now stands, the clause which makes the Bradford Corporation responsible for the minimum compensation flow of 5 million gallons only provides that this quantity of water shall be sent down if there is sufficient in the reservior to enable it to be done.

GLASGOW CORPORATION WATER SUPPLY.

The Thirty-fifth Annual Report.

At a recent Meeting of the Glasgow Corporation Water-Works Commissioners, the 35th annual report of the Water Committee was under consideration. Its most important features are given in the following extracts.

Under the head of "Finance," it was stated that the rates assessed and levied during the past financial year were as follows: Domestic water-rate within the limits of compulsory supply, 7d. in the pound; public water-rate within these limits, 1d. in the pound. The domestic water-rate levied beyond the limits of compulsory supply was the same as in the previous year—viz., 11d. in the pound. The rates and charges for supplies of water for other than domestic purposes were according to the table approved of on the 11th of April last.

By the abstract statement of accounts appended to the report, it was shown that the revenue for the year amounted to £171,256 9s. 9d.; do. from the river supply works, £2568 7s. 3d.—total, £173,824 17s. Adding the balance from the previous year, £12,205 19s. there was a grand total of £186,030 16s. The expenditure, including annuities and interest, amounted to £118,691 16s. 9d.; do. for river supply works, £4637 15s. 7d.—together, £122,729 12s. 4d.; showing a difference of £63,301 3s. 8d. The sum carried to the sinking fund account was £49,021 0s. 3d.; leaving the balance carried to the credit of the revenue account for the year 1890-1, £14,280 3s. 5d.

In a comprehensive table, the report next gave the various items of revenue for the past year, with a detailed comparison of the same sources of income in the year 1888-9, so as to show the amount of increase or decrease (where there was any) on each item. After deducting several "decrease" items, there was shown a net increase of £5910 3s. 1d. for the year 1889-90. The total revenue for the past year was £173,824 17s.; that for the previous year, £167,914 13s. 11d., as above stated—an increase of £5910 3s. 1d. The total expenditure for last year, exclusive of the sum carried to the sinking fund, was £122,929 12s. 4d.; the total expenditure for the previous year, exclusive of the sum carried to the sinking fund, was £121,359 2s. 8d. —showing an increase of £1370 9s. 8d. The expenditure account included, in addition to the ordinary items, a number of sums in the shape of outlays for a variety of purposes, and collectively amounting to £5585 8s. 9d. One of them was an item of £2000, as proportion of the expense in connection with the new Municipal Buildings. The other items were all for engineering and constructional works on the Loch Katrine conduit and reservoir at the Gorbals works.

During the past year there was added to the capital account the sum of £86,601 1s. 3d.; the largest of the individual items being a sum of £33,502 18s. 4d. on account of the Craigmaddie reservoir. There was likewise the large item of £21,276 17s. on account of the Duchray contract, as also an expenditure of £16,858 5s. for the Kelty tunnel. Under the Glasgow Corporation Water-Works Act of 1885, the borrowing power was increased to £3,000,000; the loans on mortgage, funded debt issued, corporation loans, redeemed mortgages, and sinking fund on money borrowed for the year 1889-90 was £1,938,664 13s. 10d.; leaving the balance of unexhausted power, £1,061,335 6s. 2d. The report further stated that the sinking fund set apart for, and being applied in, the redemption of mortgages and annuities, in terms of the Act, now amount to £549,480 0s. 1d.

In view of the satisfactory state of the revenue account, the Commissioners on the 29th of May last resolved that the domestic water-rate within the limits of compulsory supply for the current year should be reduced to 6d. in the pound; that the domestic water-rate beyond those limits for the same period should be reduced to 10d. in the pound; that the public water-rate should be continued at 1d. in the pound; and that the rates and charges for supplies for other than domestic purposes for the current year, with terms and conditions annexed thereto, as revised by the Committee, should be approved.

Under the head of "works," the report stated that the aqueduct for Loch Katrine, and the works at the lochs, continued to be maintained in a state of efficiency; and that the works connected with the new service reservoir at Craigmaddie were progressing satisfactorily. The two faces for which the Mugdock tunnel was driven met on July 22, 1889, and the lining of the soft parts of the rock and the concreting of the bottom were in progress. It is expected that the whole works will be completed, and the tunnel brought into use by October next. Within and beyond the Municipality there were laid during the past year pipes of a total length of 19,464 lineal yards, or fully 11 miles.

As regards the supply for the year ending May 31 last, the report stated that the quantity of water sent into the city and district daily averaged as follows: From the Loch Katrine works, 37,303,108 gallons; from the Gorbals works, 4,261,640 gallons—the total being 41,564,748 gallons. The average for the year 1888-9 was 40,863,353 gallons per day; thus showing an increase of 701,395 gallons per day. The quantity of water supplied from Cockmuir high-level reservoir to the high portions of Springburn and Garngad Hill within the Municipality averaged for 1889-90, 174,006 gallons per day; for 1888-9, 152,115 gallons per day—thus showing an increase of 21,891 gallons per day. The

river-supply works continue to be in a state of efficiency. The quantity of water supplied averaged for 1889-90, 2,371,103 gallons per day; for 1888-9, 2,413,326 gallons per day—thus showing a decrease of 42,223 gallons per day in the past year.

On the report being brought up,

Mr. WILSON, as Convener of the Water Committee, moved its adoption with the Committee's minutes. In doing so, he mentioned that, in order to induce outsiders to come to a right frame of mind, so far as the Water Department was concerned, during last month the suburbs had had the lion's share of the extensions. The Committee never refused any reasonable request for an extension of piping outside the Municipality. The water supplied from the Loch Katrine works and the Gorbals works in the city and district in April, May, and June averaged 41,768,000 gallons per day, as against 42,768,000 gallons for the corresponding three months of 1889.

Bailie J. MARTIN desired to know if there was any possibility of putting a stop to the never-ending waste of money that was taking place in connection with what were called the "River-supply works." He said he found that the revenue from these works for the past year was £2568 7s. 3d.; and the outlay on them, £4037 15s. 7d.—a dead loss of £1469 8s. 4d. If the present loss was to go on, it would be better for the Commissioners to take up the plant and sell it for what it would bring.

Mr. WILSON admitted that the works had been a loss to the Commissioners; but the Act of Parliament would prevent them interfering with them. Even if they had the Act cancelled the next day, they could not get water from Loch Katrine in lieu of that taken from the river. At the same time, he agreed with Bailie Martin's remarks.

After some further conversation, the report and minutes were adopted; the financial statement accompanying the report being approved of.

The Crystal Palace District Electric Lighting Order.—The Board of Trade have addressed a letter to the Croydon County Council, stating that they are willing to allow this Order to proceed—leaving it to the London County Council to oppose it in Parliament; but that the promoters have requested the Board to amend the Order by striking out the portion of the borough of Croydon embraced in the area of supply. Under these circumstances, the Board of Trade state that they can only give effect to the wishes of the promoters, and agree to the Order being amended as proposed. At the meeting of the Council yesterday week, some regret was expressed that, this being the case, the portion of Upper Norwood which is within the borough will not be included in the district of supply under the Order.

The Lancashire Coal Trade.—As was anticipated, there has been a rise in prices for most descriptions of coal with the beginning of the month, on account of the further advance of 5 per cent. to the colliers; but it is not at all general, and is only 5d. per ton. The demand all round continues steady; and, with but few exceptions, all the collieries are fully employed. House-fire coal still moves off freely, and commands at the pits from 11s. to 11s. 8d. per ton for best descriptions, and 10s. for second qualities. The commoner round sorts can be had for 8s. 6d. per ton. Engine coal also sells well, and the demand for steam coal for shipment shows a distinct improvement. The quotations are: Burgy, 7s. to 7s. 6d. per ton at the pits; slack, 6s. to 7s. per ton; best steam coal, 9s. 6d. to 9s. 9d. per ton delivered at the Liverpool Docks. Inferior descriptions are 3d. advance upon rates current last week. Some heavy contracts for corporation gas-works were signed during the past week. The Wigan Corporation, for instance, have accepted tenders for the next twelve months' supply.

The British Water Gas Syndicate.—In the Queen's Bench Division, in the High Court of Justice last Tuesday, the case of *Ranken and Another v. Fox and Others* came before Justices Day and Grantham, sitting as a Divisional Court, in the form of an appeal from the Judge at Chambers refusing to order the defendants to make further answers to interrogatories. Mr. Tindal Atkinson, who supported the appeal on behalf of the plaintiffs, said the action was brought by his clients against Mr. Samson Fox, of Leeds, and the British Water Gas Syndicate, Limited, to recover the price paid for some shares in the Syndicate, which they alleged they were induced to purchase on the faith of certain statements contained in the prospectus, and also on the faith of a speech delivered by Mr. Fox, as Chairman of the Company. He submitted that the plaintiffs were entitled to further answers by the defendants of interrogatories which they had administered with the object of eliciting what knowledge the Directors had of the statements contained in the prospectus. Their Lordships, after perusing the interrogatories, without calling upon Mr. Murphy, Q.C., and Mr. Asquith, Q.C., who appeared for the defendants, dismissed the appeal with costs.

Bankruptcy of a Promoter of the Clamond Incandescent Gas-Light Company.—At the London Bankruptcy Court last Thursday, Robert Tyndale Haws, described as of No. 76, Coleman Street, applied to Mr. Registrar Giffard for his order of discharge. The debtor failed in January last with liabilities of £2618, and assets £420. The debtor was joint promoter of the Clamond Incandescent Gas-Light Company, which was floated about two years ago; the other promoter being Mr. William Thompson. They did not get any cash; but, roughly speaking, they each received about 12,000 fully-paid shares. Actions had from time to time been brought against him and his colleague, to recover moneys due from them in respect of the promotion of the Company; and in all cases where judgment was given against them, he (debtor) had personally had to pay. From the Official Receiver's report, it appeared that the bankrupt commenced business as an accountant, and spent about £800 in connection with the Clamond Company; but up to the present had not been able to realize anything from the shares allotted to him. He attributes his failure to losses in connection with the Company, including law costs and expenses, and interest on borrowed moneys. It was reported that he had failed to keep proper books of account, and that he had been rash and hazardous in his speculations. He stated, as to his books, that all his business transactions, other than those relating to the promotion of the Company, were in the books of Messrs. Spain Bros., at whose offices he had done business. He had been unable to dispose of any of the shares he held. After hearing the arguments, his Honour thought the offences alleged were proved, and suspended the order of discharge for nine months.

NOTES FROM SCOTLAND.

From our Edinburgh Correspondent.

EDINBURGH, *Saturday*.

The practice of conducting their business in secret, which is so dear to public bodies in Edinburgh, has been adopted with a vengeance by the Gas Commissioners. They yesterday completed the second year of their ownership of the gas supply; yet no one outside their own circle, and I question if even the whole of themselves, know much more about the business than is contained in the minutes of the Committee meetings. Nobody wants to know any trade secrets which they may possess for the manufacture of gas; and as little does anyone desire to have information disclosed which would hamper them in the obtaining of favourable contracts. But excluding these, there is a great deal of information which might be given to the public; and which the Commissioners of Perth and Dundee (similarly constituted bodies) do impart to the public. The Commissioners have a financial policy—a policy founded on their experience; and the public have a right to know, not only what it is, but the reasons for adopting it. The business belongs to the public. The gentlemen whom they appoint to conduct it are appointed as Commissioners. Had they been appointed as trustees, there might have been some shadow of a reason for their regarding the business as in some sense their own; because a trustee, according to the law of Scotland, incurs certain liabilities with regard to the estate which he administers. But the Edinburgh Gas Act of 1888 expressly provides that the administering body shall be Commissioners, which (in its most literal sense) means that they are granted a commission by the inhabitants to provide them with gas And getting their commission from the community, they are morally, if not legally, bound to render an account to the community as to their actions. How otherwise are the people able to select the men most fitted to conduct the business, or to direct them as to what they wish done with their business? The present system leaves it open to conduct the business by means of an inner circle or ring; and it is significant that, at the monthly meeting of the Commissioners on Monday, one of the members threw out the taunt with reference to a certain communication which was being hustled away to a Committee, that "some of them had apparently seen it, but that others had not, and that before it was sent to a Committee it should be read, so that they might know what they were sending." Monday's meeting was a most appropriate occasion for making a public statement with reference to the affairs of the Commission. At the previous monthly meeting, the abstract of the accounts for the past year was laid on the table without comment. As I then stated, I was in hope that on Monday, when the accounts came up for approval, something might be said upon them; but in this I was disappointed. They were adopted without comment, and without even the formal ceremony of moving their approval. I do not know who the "artist" was that arranged the business for the meeting; but he did it very adroitly. The Commissioners had to consider and determine what their policy was to be for the year current—a proceeding which should naturally have followed the settlement of the affairs of last year. But, instead of taking up their business in the most natural way, they first of all addressed themselves to the future, and, having accomplished that, they then—of course, only formally—looked at the past. To be sure they had examined the accounts and reckoned with the past in Committee. But the public are excluded from Committee meetings—and quite rightly; and they can only judge of the Commission by what it does in public. Had the Commissioners any desire to be consistent, they would have framed their public business with the intention of making it intelligible to the public. That is what they did not do. As a matter of fact, they drifted into a discussion upon the quality of the gas, raised by a remark of the Lord Provost; and from that to a question about the want of information in the abstract of accounts. And it was only at the end of these rambling proceedings that Bailie Archibald was understood to move that the recommendations of the Finance Committee should be adopted. In the course of the second discussion, Bailie Archibald rose and said he thought it would be well that the gas consumers should have some information as to the cause of the proposal to raise the price of gas. Yet he gave no information, except that it was caused by a rise in the price of coal—information which had already been given in the letters of the Engineers, and which, by the way, the Committee did not think fit to lay before the Commission until asked by a member. Now Bailie Archibald, if he had wanted to give information, might have told how much coal was carbonized, what it cost, how much gas was derived from it, the yield per ton, the cost per 1000 cubic feet of gas made, the quantity of gas sold, the unaccounted-for gas, and the cost of management and distribution. Having given these items, he might then have stated what would be the cost of the coal they had contracted for, compared with the coal consumed last year, the yield expected from it, the total quantity they expected to produce, what the charges would be upon the Commissioners during the year, and the rate they would require to charge for gas in order to meet their outlays. After all this, the few remarks he made would have come in quite appropriately. Then the public would have had some understanding of why the price of gas had been raised; and there would have been less grumbling at it than when the increase is thrust upon them without reason given. If the Commissioners are unequal to the task of explaining how the business stands, they have officials who are in every way capable of preparing a statement for them. Before closing this long notice, I may state that there is already a good deal of grumbling by the public at the rise in the price; but what most of all concerns them is the quality of the gas, which they have taken into their heads is not what it used to be. I do not sympathize with them in the latter idea, which I think is a mistaken notion that has arisen without any foundation.

Electric lighting notices have been flying pretty thick during the past two months; but there is apparently little desire on the part of the local authorities to take the subject up. In Edinburgh, several companies have lodged notices; and at a recent meeting of the Town Council, Mr. Auldjo Jamieson recalled their promise to Lord Balfour of Burleigh last year, that they would themselves undertake the supply of electric light whenever it was settled who was the body to take

charge of it. Without this reminder from one who has proved himself to be in sympathy with electric lighting, it is probable that the Council would have altogether forgotten their promise. As it was, being held to it, they appointed a Special Committee to consider what they were to do. The Committee met on Thursday last; and, acting upon the advice of Mr. Beveridge, the Parliamentary Solicitor, they have resolved to apply to Parliament for a Provisional Order empowering them to provide and supply the light.

The new water-works for Falkirk and Larbert were opened by the Duchess of Montrose on Tuesday. There was a good deal of ceremony at the opening; the day being observed as a half-holiday, and the dignitaries being honoured with an escort of volunteers. The Duchess turned on the water at the Little Denny reservoir, by means of a silver key which was presented to her, and which she said she would cherish as a memento of the interesting occasion. Provost Watson was presented by Mr. Copland, the Engineer of the works, with a solid silver cup of Queen Anne design, and bearing a suitable inscription. Mr. Cockburn, the Convener of the Water Trust, was also the recipient of a pair of small silver cups from the Contractors, Messrs. Stewart and Co., of Glasgow. The water having been tasted by the Duchess and the Provost and Magistrates, the party adjourned to a wooden shed, where refreshments were served. The works were begun in April last, and have cost £70,000.

The Select Parliamentary Committee on Rating and Valuation in Scotland—appointed in 1888, with Mr. J. B. Balfour, Q.C., at its head—has prepared its report. One of the chief questions which it had to consider was the rating of water-works, which is felt to be at present effected by a system which is grievous to the owners of the works. As is well-known, the present method is to fix the total value of the works by deducting from the profits a percentage in the name of depreciation and tenants' profits, and to hold the remainder as the amount which a tenant would pay for them. There is no objection to this; it is the method of allocating the total amount among the different parishes or rating areas which is complained of. In the case of water-works, the pipe-tracks very often pass through several rural parishes, where land is cheap and the rates are high per £1 of the rental. It has been contended for years that when these parishes receive a proportion of the total valuation equal to the proportion of expenditure in them of the original construction, they receive too much, because the original construction in them merely consisted of laying the track, whereas in the city it included many other things. As a matter of fact, the Edinburgh Water Trust pays as much as £325 in one parish, and £244 in another, for pipe-tracks passing through a few miles of ground in them. This is rather a heavy burden, when over and above it the Trust compensated the proprietor for the land, and the agricultural tenant for any damage which they may do. The Committee heard a good deal of evidence on the subject; but they have unfortunately come to the conclusion that they cannot propose a change. To them, it appears that the just proportions of the aggregate valuation are ascertained as well by the method now in use as by any other which could be suggested; and they consider that the present method may be continued. To this finding, Mr. Edmund Robertson, M.P. for Dundee (from whence the movement for a change has received its principal support), objected; and he proposed that the present structural value of water-works should be fixed in each parish by the assessor of canals and railways, and that he should rate underground works at one-fourth of their present value. This motion was, however, thrown out by the Committee.

From our Glasgow Correspondent.

GLASGOW, *Saturday*.

Last Thursday afternoon, a new retort-bench, in connection with the extensions which have for some time been in progress at the Dumbarton Corporation Gas-Works was brought into requisition for the first time. The new retort-house containing this bench has been erected on ground that was obtained some time ago by the covering over of the Knoll Burn, and is an important addition to the works. The system of construction that has been adopted in the new bench by Mr. James M'Gilchrist, the Engineer, is one of his own—four retorts to one oven. There is sufficient room in the new retort-house for seven such ovens, or twenty-eight retorts. This addition to the manufacturing power will eventually enable Mr. M'Gilchrist to increase his make to double its present amount, which is somewhere about 40 million cubic feet per annum.

On Tuesday of the present week the shareholders of the Coatbridge Gas Company held their half-yearly meeting. Mr. David Bird, the Chairman of the Company in succession to the late Mr. M'Lachlan, presided. From the report which was submitted by the Directors, it was shown that the affairs of the Company continue to be in a prosperous condition. Over the half year there was a total income of £5677 7s. 9d., and the profits amounted to £1766 13s. 6d., which, with the balance of £1871 brought from the preceding half year, made a total of £3637 13s. 6d. applicable for dividends. During the half year the mains were extended in the Coatdyke, Dunboth, and Blairhill districts at a cost for material of £278 4s.; and the number of meters in use was increased to the extent of 116, at a cost of £124 14s., both of these sums being charged to "Works Account." The repairs during the half year were exceptionally heavy, because of street alterations for the improvement of the burgh; and partly on that account the unaccounted-for gas reached the somewhat high rate of 11·91 per cent. The average illuminating power of the gas over the half year was 26·72 standard candles. Up to June 30 there was sold per meter to consumers 27,140,100 cubic feet of gas, and for public lamps 1,030,600 feet. These two quantities together realized, at 3s. 4d. per 1000 feet, £4695 2s. 4d. At the same date the amount of gas in stock was 280,000 cubic feet, as compared with 240,000 feet at Dec. 31, 1889. The meter-rents yielded £215 6s. 10d. For tar, naphtha, &c., sold there was realized £343 12s. 4d.; sulphate of ammonia (less cost of manufacture) yielded £322 7s. 11d.; and coke and spent lime realized £19 11s. 3d. For gas coal and shale used, there was expended £1516 1s. 6d.; for dross and house coal, £90 6s. 2d.; and for lime and oxide, £56 18s. 2d. The half-year's wages amounted to £677 3s. 6d.; the salaries to £340; and the Directors' and auditors' fees are set down in the balance-sheet at £88 15s. 4d. Amongst the Company's liabilities there are the original stock and the new stock—respectively, £12,650 and £32,000, or £44,650 in all. Loans amounting to £2000 have been raised by the Company. Then there are consumers' deposits amounting to £685 8s. 11d., and the suspense fund stands at £3000. In the shape of assets there are the gas-works, mains, meters, &c., set down collectively at £45,329 4s. 2d.; the sulphate works and plant being rated at £556 11s. 7d., and the tar works at £229 4s. 9d. The stocks at June 30 stood at a high level, there being in store some six or seven months' supply of gas coal and shale purchased at much lower prices than those which have ruled of late. Including cash in bank, the assets as at June 30 were rated at £54,523 15s. 8d. The report was approved at the half-yearly meeting of the shareholders; and the maximum dividends at the rate of 10 and 7 per cent. on the old and new stocks, respectively, were declared.

A very satisfactory report and balance-sheet will be presented to the Kilmarnock Corporation Gas Commissioners at their next meeting. On the operations for the year ending June 14, 1890, there was a gross revenue of £12,644 1s. 4d., the gross expenditure amounting to £9907 14s. 1d.; leaving a surplus of £2736 7s. 3d. The total quantity of gas manufactured during the year was 67,270,900 cubic feet.; and the total quantity of coal carbonized was 7032 tons 17 cwt., the total cost of which was £4057 0s. 3d. The gas sold, as per consumers' meters, amounted to 59,373,780 feet, for which there was realized a sum of £10,514 6s. 10d.

The net increase of the Glasgow gas supply is likely to meet with a sensible check, owing to a very greatly increased extension of electric lighting which has just been resolved upon by the Directors of the Caledonian Railway Company for their Central Station—hotel, offices, stores, booking offices, booking hall, lavatories, clock-tower, Argyle Street under-bridge way, &c. There will be eventually an installation of something like 1700 incandescent lamps, in addition to the extensive installation of Brush arc lamps over the platforms for the arrival and departure of trains. The contract for the installation has been let to a Glasgow firm—Messrs. Mavor and Caulson; and it is to be completed in three months.

The Glasgow pig-iron market has been extremely steady during this week. Scotch warrants have only varied in price between 45s. 9d. paid on Monday, and 46s. 1½d. per ton cash, at which there were sellers yesterday afternoon. Very little business was done during the week in Cleveland or hematite iron, nor was there much business in Scotch iron reported.

As the Fair Holidays are again closed for a year, the collieries have generally been turning out their usual supply of coal. In a number of instances higher prices are being asked for main and furnace coals; but buyers are indisposed to concede the advance. The former is quoted at about 9s. per ton f.o.b., and the latter at 8s. 6d. to 9s. 6d. The ruling quotation for steam coal is 10s. 9d. to 11s. 3d. per ton.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 2.

Sulphate of Ammonia.—An improved tone is noticeable; and prices have a hardening tendency. American and Spanish orders have completely cleared the Liverpool market; and £11 12s. 6d. is now quoted. Business at £11 10s. is reported at Hull; and £11 12s. 6d. is once more asked for best makes. Firmer reports come from Leith and London, as well; and in view of the small production during August, higher prices appear to be in store. Nitrate also remains in a firm position; and forward buying is taking place at full values.

Daventry Water Supply.—At a meeting of the Daventry Town Council on Monday last week, the Water Committee presented a report, in which they expressed the opinion that the water supply of the borough should be in the hands of the Corporation; and with a view to this being brought about, they recommended that a Committee be appointed to meet the Directors of the Water Company for the purpose of carrying on negotiations with that body; also that an engineer should be consulted as to the scheme proposed by Mr. Beeby Thompson, of Northampton, who had reported on a scheme of water supply for the district. The report of Mr. Thompson was to the effect that he had calculated the supply for 5000 people at 20 gallons per head per day, which would mean a supply of 100,000 gallons daily. The Town Clerk (Mr. F. Willoughby) said he had received a letter from the Daventry Water Company, in which it was stated the Directors had carefully considered the question of the water supply, and were preparing a scheme for providing sufficient for the whole of the town. Alderman Thornton moved the adoption of the Committee's report; and in doing so said he thought the time had arrived when the supply of water for the borough should be in the hands of the Council. The motion was carried.

The Northern Coal Trade.—A heavier business has been done in the coal trade of the North during the last few days. The expectation of labour troubles in Wales has driven a considerable number of orders in this direction, especially for steam coals. For best Northumbrian steam coals, about 13s. per ton, free on board in the Tyne, is the price firmly asked, and large sales have been made. For second-class coals, the price varies from 11s. 6d. to 12s.; and for small steam coals, about 6s. 6d. to 7s. is the current rate. Gas coals are in good demand. For the best Durham qualities it is said that from 12s. to 12s. 6d. free on board is the figure; but it is known that some contracts of moment have been fixed at between 11s. and 11s. 6d. free on board. There is improvement in the local inquiry for gas coals, but less is being sent just now to the Italian ports, and the Baltic requirements seem to be in a degree satisfied. Still, for the time of the year, the demand for best gas coals is large and steady. Household coals are very flat; and the fine weather will further limit the consumption. Manufacturing coals are firm. For best blast furnace coke, the price is steady at about 18s. to 18s. 6d. per ton, free on board in the Tyne. Gas coke is, perhaps, a little easier, and the chief users of it—the cement makers on the Tyne—are asking for a reduction from 13s. per ton, as fixed at the end of last year.

The Lancaster Corporation and their Damas Gill Reservoir.—At the last meeting of the Lancaster Town Council, Mr. Huntington, in moving the confirmation of the Water Committee's minutes, replied to a question put by Mr. Bell as to the cost of the Damas Gill reservoir. He said that up to the 30th of June this year the total outlay had been £23,575 15s. The total payments had been £20,759 12s. 10d.; but in addition to this there was the retention-money on the contractors' work, £2170 2s. 2d., and plant handed over by a former contractor worth £646. Mr. Bell asked the amount of the original contract. Mr. Huntington said the first contract, accepted in October, 1885, was £13,832 10s. 10d.; and the amount of the second, accepted in March, 1887, was £14,315 1s. 4d. Mr. Bell gave notice that in consequence of this very extraordinary statement—the great difference between the actual cost and the amount of the original contracts—he should call further attention to the subject at the next meeting. It was pointed out to Mr. Bell that the £23,575 did not represent the contract solely, but included the purchase of the land and other items. The minutes were confirmed.

Lothammer Gas Company, Limited.—A meeting of the holders of cash-paid shares in this Company, which is at present in liquidation, was held last Tuesday at the Hotel Victoria, Northumberland Avenue, for the purpose of considering the position of affairs, the advisability of purchasing the eleven patents, and of receiving important statements. Mr. C. E. Parker-Rhodes, who presided, said that his special object in calling the shareholders together was to state to them that their money was gone, so far as the original Company was concerned. The Company was in liquidation, and every investigation was being made as to how it was originated and carried on by the promoters and Directors. The main point they had to consider now was as to whether or not they could find sufficient money to buy back the patents; and so get back in the future what they had already lost by the investment. If the shareholders present would inform him of the amount they were prepared to subscribe, or were disposed to contribute towards purchasing these patents from the Court of Chancery, they might start afresh and form a new Company. The patents contained all the elements of success. There were 95 shareholders in the old Company, possessing 2611 shares. If they would each put down (say) 2s. 6d. per share, they would have something like £1500. A number of shareholders having handed in their names with the promise of contributions, the Chairman explained that a meeting would shortly be called at which the amount promised would be announced, and at which the opinion of the shareholders would be asked as to the action to be subsequently taken.

Sales of Shares.—At the Auction Mart, Tokenhouse Yard, last Wednesday, Mr. Alfred Richards sold by auction 1200 £10 shares in the *Enfield Gas Company* (maximum dividend, 7 per cent.). The prices realized were as follows: 20 sold at £12 5s.; 400, at £12; 50, at £11 15s.; 20, at £11 12s. 6d.; 100, at £11 10s.; 70, at £11 7s. 6d.; 20, at £11 5s.; 220, at £11 2s. 6d.; and 300, at £11.——Last Wednesday, Messrs. Buckland and Sons sold 83 shares in the *Windsor Royal Gas Company*, at the Castle Hotel, Windsor. The sale included 26 original shares of £20 each, fully paid, which realized £41 and £41 10s. per share. Some preference shares were next put up in lots, and fetched from £9 10s. to £10 per share. A small parcel of new shares fetched £30 10s. each; and 27 new shares, £8 paid, were knocked down at gradually rising prices—£11 15s. being the top figure attained. ——At Preston last Thursday, Mr. H. C. Walton offered for sale £100 consolidated "A" stock (10 per cent.) in the *Preston Gas Company*, with the dividend, which brought £213. At the same place, several hundred pounds of ordinary stock in the *Newcastle and Gateshead Water Company*, and also £150 per cent. preference stock in the same undertaking were offered. The greater part of the stock was disposed of; the price obtained being £235 per £100 share.——Last week a number of shares in the *Croydon Commercial Gas Company* were sold by auction at Croydon. Ten first capital £5 shares were sold for £13 17s. 6d. per share; and 30 similar shares realized £13 15s. Ten £5 shares of second capital produced £13 15s. apiece; and 50 similar shares £13 12s. 6d. Twenty £5 shares "A" 1871 capital fetched £13 12s. 6d.; and prices ranging between £10 12s. 6d. and £11 were paid for 120 £5 shares of third capital. Thirty "B" 1876 £5 shares sold for £10 12s. 6d. and £10 15s. A debenture of £1500 in the same Company produced £1505.

A Generous Proposal by the Hastings Gas Company.—The Engineer and Manager of the Hastings and St. Leonards Gas Company (Mr. C. E. Botley) recently addressed a letter to the Town Clerk of the Hastings Corporation in regard to the public lighting. He pointed out that the "Whitehall" lamps in use in the borough are mostly fitted with four gas-burners, three of which are lighted from dusk until 11 o'clock p.m., when they are put out, and one central one lighted; and the price charged to the Corporation is based on this arrangement. The lighting is very much improved, if the whole of the four burners are alight at one time, as it gives greater solidity and steadiness to the flame, and this intensifies the lighting power of the lamps; but it increases the consumption of gas by 7200 cubic feet per lamp per annum. In view of the more general adoption of these lamps now going on, and to assist in some measure the better lighting of the town, Mr. Botley said he had the pleasure to inform the Corporation that on and after the 1st ult. the Company would light the whole of the "Whitehall" lamps in the borough, fitted with the four burners, in a complete manner until 11 o'clock p.m., without any extra charge to the Corporation, and the future prices of lighting these lamps would be based on a similar calculation. After 11 o'clock p.m. the lamps will be turned down to the single burner, as at present. The number of lamps thus affected will be about 90. At last Friday's meeting of the Corporation, Mr. Perkins moved that the offer be accepted with thanks; and observed that it must be very gratifying indeed to the Lighting Committee to have this somewhat generous proposal made to them. As was stated in the letter, 90 lamps would be affected, which represented an expenditure to the Company of at least £100 a year. Besides this it would be an inducement to the Lighting Committee to have the "Whitehall" lamps used as far as possible. When they considered that the Gas Company were on the eve of getting coal at a much higher rate, he thought their act was one of kindness. Mr. Jenner seconded the motion, which was unanimously agreed to.

GWYNNE & BEALE'S PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: GWYNNEGRAM LONDON." TELEPHONE No. 2698.

GWYNNE & CO.,

HYDRAULIC AND GAS ENGINEERS,

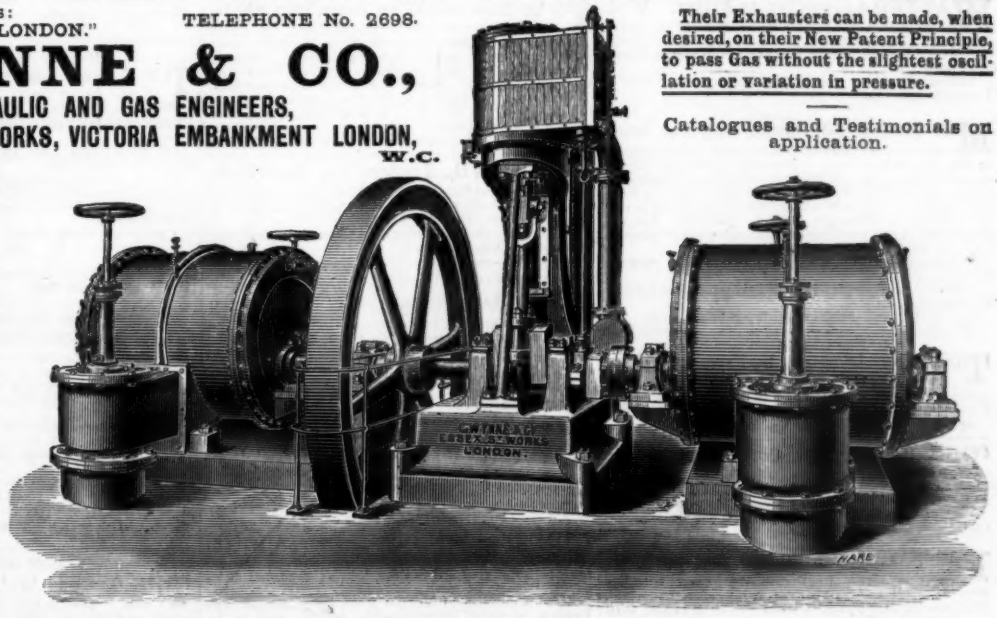
ESSEX STREET WORKS, VICTORIA EMBANKMENT LONDON, W.C.

Thirty-three Medals at all the Great International Exhibitions have been awarded to GWYNNE & Co. for Gas Exhausters, &c.

They have completed Exhausters to the extent of 29,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH-SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.



Their Exhausters can be made, when desired, on their New Patent Principle, to pass Gas without the slightest oscillation or variation in pressure.

Catalogues and Testimonials on application.

Exhausting Machinery at Fulham and Bromley Gas-Works—each set passing 400,000 cub. ft. per hour, drawing 14 miles distant from Beckton.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAYS.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.

Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.

JOHN WM. O'NEILL, Managing Director.

JAMES LAWRIE & CO. supply Best SCOTCH CANNEL COALS, Best FIRE-CLAY RETORTS, BRICKS, TILES, and LUMPS; BOILER SEATING BLOCKS, FLUE COVERS, and SILICA BRICKS for SPECIAL FURNACE WORK; COKE BARROWS, BOGIES, and SMALL WAGONS.

Postal Address: 1, WHITTINGTON AVENUE, E.C.

Telegram Address: "EIRWAL LONDON."

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application. Spent Oxide and Sulphate of Ammonia purchased.

120 and 121, NEWGATE STREET, LONDON, E.C.

CANNEL COAL, ETC.

JOHN ROMANS & SON, EDINBURGH.
Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.
Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEAR DALKEITH, } SCOTLAND.

HUTCHINSON BROTHERS, Barnsley,
Gas Engineers and Contractors, Makers of Wet and Dry Gas-Meters and General Gas Apparatus, Sulphate of Ammonia Plant, Lead Saturators, Tanks, &c. Tools and Sundries.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

SULPHURIC ACID, B.O.V., for Sulphate of Ammonia Making. Guaranteed clear, of full strength, and to produce a fine white-coloured salt, Delivered in carboys or railway tank waggons.
For prices and terms address BALE, BAKER, AND CO., 120 & 121, Newgate Street, LONDON.

TAR and Liquor wanted.
BROTHERTON AND CO., Commercial Buildings, LEEDS.

EXTRACT from the Harrogate Gas Company's Report, dated the 5th of February, 1890: Coal consumed, 8600 tons. Gas made, 92,880,000 feet; ditto sold, 84,880,000 feet; ditto unaccounted for, 8,000,000 feet; quantity made per ton, 10,800 feet; ditto sold, 9869 feet. Illuminating Power, 16·1 candles. Coals used, Brancepeth. Owners, Strakers and Love, Newcastle-on-Tyne; who have also Brandon Hutton Seam Unscreened Gas Coal. Analysis, 10,500 cubic feet per ton; Illuminating Power, 16·2 candles.

WANTED, a second Fitter. One accustomed to Gas-Works preferred. Wages 24s. per week. Constant employment. Also a YOUTH as Apprentice.
Apply to the MANAGER, Gas-Works, FALMOUTH.

YARD Foreman wanted, who has been used to the general work (but not stoking nor fitting) of a small plant. Wages 24s. per week, with House, Garden, Coals, Gas, and Water free.
Apply in own writing to,
J. C. ARCHER,
Bridlington Gas Co.,
Aug. 1, 1890.

WANTED a Situation as Manager's Assistant, Engineer, Draughtsman, or Chemist. Just returned from erecting extensive Gas, Mineral Oil, and Chemical plant in Brazil. Experienced designer and experimentalist.
Address, Engineer, Chepstow Cottage, Griffithstown, Newport, Mon.

WANTED a Situation as Fitter. Well up in iron and compo. fitting, heating and cooking stoves. Main and Service Laying, Index Taking, and Meter Fixing. Eight years at a Gas-Works. Good reference.
Address No. 1846, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

MR. Thomas Wilkinson, who has been for the last fifteen years Manager and Secretary to the Newmarket Gas Company, Cambridgeshire—Annual make of Gas, 36 millions cubic feet; dividends, 11 per cent.—SEEKS AN ENGAGEMENT of any kind (not menial) in a Gas-Works, or with a good firm in the Gas Trade, at home or abroad. Married. Age 39. Highest references and testimonials from last employers will be sent upon application.
Remuneration according to position and responsibility.
Address: 1, Springfield Villas, Springfield Road, Bury St. Edmunds, Suffolk.
*** This advertisement will not be repeated.

LLANBERIS GAS-WORKS.

TO BE SOLD cheap, by Private Treaty, the above Works, erected in 1871 at a cost of £2500, which are compact and in good working order. Freehold.
Apply to ROBERT ALGEO, ESQ., MENAI BRIDGE.

THE Hornsey Gas Company have for SALE Two Cast-Iron TOWER SCRUBBERS—one 7 ft. 6 in. diameter by 30 feet high, and the other 10 feet diameter by 40 feet high—in good condition.
Full particulars can be obtained at the GAS-WORKS, Clarendon Road, HORNSEY, N.

FOR SALE—One 20,000 feet per hour Station Meter in rectangular case, together with Bye-pass and Valves. All in first-class condition. Also four 12 feet square PURIFYING BOXES, with centre valve and connections.
For particulars apply to the undersigned,
ROBERT PORTER,
Secretary and Manager.
Gas-Works, Elland,
Aug. 1, 1890.

FOR SALE—One 8-horse power Engine and COAL BREAKER, with top and bottom Elevator, Gear, and Patent Wrought-Iron Chain, with Malleable Iron Buckets complete.
The above Machinery is almost new, having only been in use about Three months.
For further particulars, apply to the COAL DISTILLATION COMPANY—COOPER'S PATENTS—LIMITED, 323 and 323, Winchester House, Old Broad Street, LONDON E.C.

W. C. HOLMES & Co., Huddersfield, AND 80, CANNON STREET, LONDON,
Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. 280 of this week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for Wet and Dry Gas-Meters, Station Meters, and Governors, Pressure-Gauges, Street Lamps, and Pillars, &c.
Telegraphic Address: "Braddock, Oldham."

SULPHURIC ACID.

HUGH WALLACE & CO., Chemical Manufacturers (the old-established firm), supply the above, which is specially adapted for making White Sulphate of Ammonia. The latter purchased in any quantities at highest market prices, or contracts for the year.
For price and terms apply Botolph House, Eastcheap, LONDON, E.C.

TENDERS FOR COAL.

THE Eccleshill and Bolton Gas Company invite TENDERS for 2000 tons of GAS COAL, to be delivered at the Railway Station (G.N.R.) in Twelve months, in such quantities, from time to time, as may be required.
Tenders, endorsed, must reach me not later than Thursday, the 7th of August.
J. MELLOR, Secretary.
Eccleshill, near Bradford,
July 25, 1890.

TAR AND LIQUOR.

THE Eccleshill and Bolton Gas Company invite TENDERS for the surplus TAR and AMMONIACAL LIQUOR, to be produced at their Works, together or separately, for Twelve months, from the 1st of September next.
Can be delivered in Contractor's Tanks at the Station (G.N.R.).
Coal carbonized, per annum, about 1800 tons.
Tenders, sealed and endorsed, must reach me not later than Thursday, the 7th of August.
J. MELLOR, Secretary.
Eccleshill, near Bradford,
July 25, 1890.

FOR SALE—One Single Gasholder, 80 feet diameter by 20 feet deep, ten Cast-Iron Columns and Wrought-Iron Girders.
Also four PURIFIERS in a group, 16 ft. by 12 ft. by 3 ft. 9 in. deep; 12-inch Centre-Valve and Connections.
Would erect the above, and make practically equal to new.
Inquiries invited for various second-hand Gas Plant—Gasholders, Tanks, Purifiers, Washers, Exhausters, Station Meters, &c.
Apply to SAML. WHILE (late Ashmore and While), 60, Queen Victoria Street, LONDON, E.C.

FARNWORTH, NEAR BOLTON.

TO be Sold or Let on Lease (the whole, or such parts as may be agreed upon), the SITE of the late CHEMICAL WORKS at Prestolee, with Buildings thereon, and the use of Chimneys. Suitable for carrying on the business of Vitriol, Soda Ash, Bleaching Powder, Soap, and other manufactures. Coal and Water adjoining the Land, and convenient for carriage. A Canal, with a branch wharf, runs alongside the property.
Apply to JOSEPH LEACH, Estate Agent, FARNWORTH.

WANTED, Tenders for Gas-Works Plant for COOLING, WASHING, and PURIFYING GAS from a weekly carbonization of 35 to 40 tons of Coals in Winter.
Apply to the Washington Chemical Company Washington, Co. Durham.

GAS EXHAUSTER AND ENGINE WANTED.

THE Gas Committee of the Newry Town Commissioners invite TENDERS for the supply and erection of a new GAS EXHAUSTER, capacity 20,000 cubic feet per hour, and an eight-horse power STEAM-ENGINE, with the necessary Couplings and Connections for working the Gas Exhauster.
The Gas Committee will provide and build the requisite foundations.
Further particulars can be obtained from Mr. A. Gibb, Manager; and sealed tenders, addressed to the Chairman, Gas-Works, Newry, to be delivered up to Thursday evening, the 7th of August next.
J. KERNAGHAN, Secretary.
Gas-Works, Newry, July 26, 1890.

TENDERS FOR GAS COAL.

THE Directors of the Clayton, Allerton, and Thornton Gas Company invite TENDERS for the supply of about 5000 tons of Screened GAS COAL, COBBLES, or NUTS, and 800 tons of CANNEL COAL. The Coal to be free from Scale, Sulphurous Pyrites, or other objectionable matter, and to be delivered at the Gas-Works, Low Lane, Clayton, or at the Great Northern Railway Station, Clayton, in such quantities weekly as may be ordered by the Company's Manager.
The said tenders to state the Seam and Pit from which the Coal is intended to be sent.
Sealed tenders, endorsed "Tender for Gas Coal," and addressed to the Chairman at the Gas-Works, to be delivered at or before Noon on Monday, the 11th day of August, 1890.
The Directors do not pledge themselves to accept the lowest or any tender, reserving to themselves the right to divide the contract as they may think proper.
By order, JOHN NIVEN,
Secretary and Manager.
Gas-Works, Clayton, near Bradford,
July 8, 1890.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

COZE'S Automatic Apparatus for CHARGING AND DISCHARGING GAS-RETORTS. For Illustrated Advertisement of this System, see p. 324.
Inquiries should be addressed to THE COZE SYNDICATE, LIMITED, 86-88A, LEADENHALL STREET, E.C.

BENTLEY & CO.

MANCHESTER ELECTRICAL STORES.

FOR Batteries, Bells, Wires, and Special Electrical Apparatus, address the best house
17, NEWTON STREET, PICCADILLY, MANCHESTER.

TUBES.

FOR Gas, Steam, and Water; Galvanized, White Enamelled, and Hydraulic Tubes, &c.
JOHN SPENCER, Globe Tube Works, WEDNESBURY, and 14, Great St. Thomas Apostle, LONDON.

TENDERS FOR GAS COAL.

THE Gas Committee of Limerick are prepared to receive TENDERS for the supply of 6000 Tons of NEWCASTLE GAS COALS.
Particulars on application to the Gas Manager, 84, William Street, Limerick.
Aug. 2, 1890.

COUNTY BOROUGH OF SALFORD.
GAS DEPARTMENT.

OXIDE OF IRON.

THE Gas Committee are prepared to receive TENDERS for the supply of 500 tons of OXIDE OF IRON for purifying the Gas at their Works.
Forms of Tender and further particulars may be obtained on application to the Gas Engineer, Gas Offices, Bloom Street, Salford.
Sealed Tenders, endorsed "Oxide of Iron," to be sent to me not later than 5 p.m. on Thursday, the 7th of August next.
By order,
SAML. BROWN, Town Clerk.
Town Hall, Salford,
July 30, 1890.

COUNTY BOROUGH OF SALFORD.
GAS DEPARTMENT.

SPENT OXIDE.

THE Gas Committee invite Tenders for the purchase of about 850 tons of SPENT OXIDE.
Further particulars and forms of tender may be obtained from the Gas Engineer, Gas Offices, Bloom Street, Salford.
Sealed Tenders, endorsed "Spent Oxide," to be sent to me not later than 5 p.m., on Thursday, the 7th of August next.
By order,
SAML. BROWN, Town Clerk.
Town Hall, Salford.
July 30, 1890.

LEIGH LOCAL BOARD.

THE Gas Committee of the Leigh Local Board invite TENDERS for the supply and delivery of about 300 tons of Cast-Iron MAIN PIPES and CONNECTIONS, from 18 inches to 3 inches diameter.
All particulars, with form of tender, may be had from the undersigned.
Sealed tenders, endorsed "Mains," and addressed to Mr. Alderman Thorp, Chairman, to be delivered at the Town Hall, Leigh, on or before Monday, the 18th of August next.
The lowest or any tender not necessarily accepted.
ALFRED T. FLETCHER,
Engineer and Manager.
Gas-Works, Leigh, Lancashire,
July 26, 1890.

LEIGH LOCAL BOARD.

THE Gas Committee of the Leigh Local Board invite TENDERS for the purchase of the surplus TAR produced at their Gas-Works for a period of One year from the 1st of September next.
All particulars, with form of tender, may be had from the undersigned.
Sealed tenders, endorsed "Tar," and addressed to Mr. Alderman Thorp, Chairman, to be delivered at the Town Hall, Leigh, on or before Monday, the 18th of August next.
The highest or any tender not necessarily accepted.
ALFRED T. FLETCHER,
Engineer and Manager.
Gas-Works, Leigh, Lancashire,
July 26, 1890.

BOROUGH OF DEWSBURY.

THE Gas and Water Committee of the above Corporation invite TENDERS for the supply and delivery, during the Twelve months ending the 31st day of August, 1891, of
1. Sulphuric Acid.
2. Wet and Dry Gas-Meters.
3. Cast-Iron Gas and Water Pipes.

Specifications and forms of tender may be obtained on application to the Gas Engineer, Mr. Chas. A. Craven, Gas-Works, Savile Town, Dewsbury.
Tenders, under sealed cover, endorsed "Sulphuric Acid," "Meters" or "Cast-Iron Pipes," (as the case may be), to be sent to me not later than Saturday, the 9th day of August next.
The lowest or any tender will not necessarily be accepted.
By order,
E. MAWDESLEY, Town Clerk.
Town Clerk's Office, Dewsbury,
July 23, 1890

HUYTON AND ROBY GAS COMPANY.

THE Directors of this Company invite TENDERS for the Supply of about 1400 Tons of best screened GAS NUTS or GAS COAL, and 200 Tons of best screened CANNEL, to be delivered during the period ending June 30, 1891, in the Gas-Works Siding, Huyton Quarry, in such Quantities as may be required by the Company.

The Material to be clean, dry, and fresh worked.

The Company will provide their own Wagons for Transit.

Tenders, sealed, and endorsed "Gas Coals," specifying the description of Coal, and the name of the Pit from which the Coal is to be supplied, may be sent in to me not later than Saturday, the 9th of August next.

FRED. PRITCHARD,
Secretary and Manager.

Huyton Quarry, near Liverpool,
July 28, 1890.

BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is hereby given that the Ordinary Half-Yearly General Meeting of the roprietors of the above Company will be held at the Guildhall Tavern, Gresham Street, in the City of London, on Friday, the 29th day of August next, at Half-past Twelve o'Clock in the Afternoon precisely, to receive the Report of the Directors and the accounts for the Half Year ended the 30th day of June last, to declare a Dividend, and to transact the general business of the Company.

The Transfer Books will be closed from the 16th to the 29th of August, both inclusive.

By order of the Board,
ALFRED LASS, Secretary.

Office: 30, Gracechurch Street, London,
Aug. 1, 1890.

HOLMSIDE GAS COALS.

THE Owners of Holmside and South Moor Collieries possess an undivided area of nearly 5000 acres of COAL in the County of Durham, over the greater portion of which area the most of the best Coal of the district, including the well-known Hutton Seam, remains almost untouched; and as preparations are being made for working the Hutton Seam on a large scale, it is expected that the reputation of HOLMSIDE GAS COALS will be still further increased. The Holmside and South Moor Collieries have been in the hands of the same families for over half a century; but, until lately, no adequate attempt has been made to open out their very large Coal-Field, notwithstanding that the best Coal of the district around them, and especially the Hutton Seam, has been for some time past seriously diminished by reason of the vigorous workings of neighbouring coal-owners. Holmside Gas Coals are now being worked out of Holmside and South Moor Collieries at a rate of about 2200 tons per working day—a rate totally inadequate to meet the existing demand. By an extensive development of workings in the Hutton Seam, it is hoped that the demand may be fully met, and the quality raised to the highest point attainable by Durham Coal.

For price and particulars, apply to MARK ARCHER, Holmside and South Moor Offices, Quayside NEWCASTLE-ON-TYNE.

Fcap. 4to, Cloth, Gilt Lettered, numerous Illustrations, price 7s. 6d., post free.

Practical Photometry:

A GUIDE TO THE STUDY OF THE

MEASUREMENT OF LIGHT.

By William Joseph Dibdin, F.I.C., F.C.S.,

Chemist and Superintending Gas Examiner to the London County Council.

London: WALTER KING, 11, Bolt Court, FLEET ST., E.C.

JUST PUBLISHED.

EDITED BY CHARLES W. HASTINGS.

The Gas & Water Companies' Directory, 1890,

With new Sections, Electric Lighting, and Traders' Directory.

5s. Post Free.

GAS-WORKS STATISTICS, 1890,

3/6, Post Free.

WATER-WORKS STATISTICS, 1890.

2/6, Post Free.

The above Three Works Handsomely Bound in Cloth, in One Volume,

PRICE 10s. POST FREE.

These Books have been thoroughly revised to date, and contain much valuable and additional information.

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HAZELL, WATSON, & VINEY, LD.,
1, CREED LANE, E.C.

Price 6s., Cloth Bound, Bevelled Boards,

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AND OTHER PAPERS

CHIEFLY RELATING TO

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BY

F. SOUTHWELL CRIPPS, Assoc. M. Inst. C.E.

Reprinted from the JOURNAL OF GAS LIGHTING, *Fully Revised and Corrected by the Author, with many Additions.*

LONDON:
WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Inventions may be secured for Twelve months; or LETTERS PATENT which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on application.

PREPARED HYDRATED OXIDE

FOR PURIFYING COAL GAS.

As extensively used in Yorkshire, Lancashire, the Midlands, and Abroad.

Manufacturers: BAILES & HALLSWORTH,

Armley, Leeds, & at Bradford, Manchester.

G. E. TOURNAY,

Contractor for the Erection and Re-Building of

GAS-RETORT SETTINGS,
CHIMNEY SHAFTS,
FURNACES, & BOILER SETTINGS,

THANNINGTON, CANTERBURY.

ARMSTRONG'S
PATENT
CANDLE SAFETY LAMPS.

Are a great improvement on Oil, giving a good Light requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7, or 9 hours.

3, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

PATENTS FOR INVENTIONS,

REGISTRATION OF TRADE MARKS and DESIGNS in all Countries.

SEARCHES made *re* novelty, and opinions given on all matters connected with above. *Full particulars on application to*

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Illuminating Power - - - - - 26 Candles.
Coke per Ton, - - - - - - - 57 per cent. of a quality almost equal to that made from the best Coking Coal.

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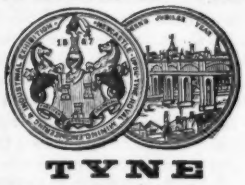

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Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
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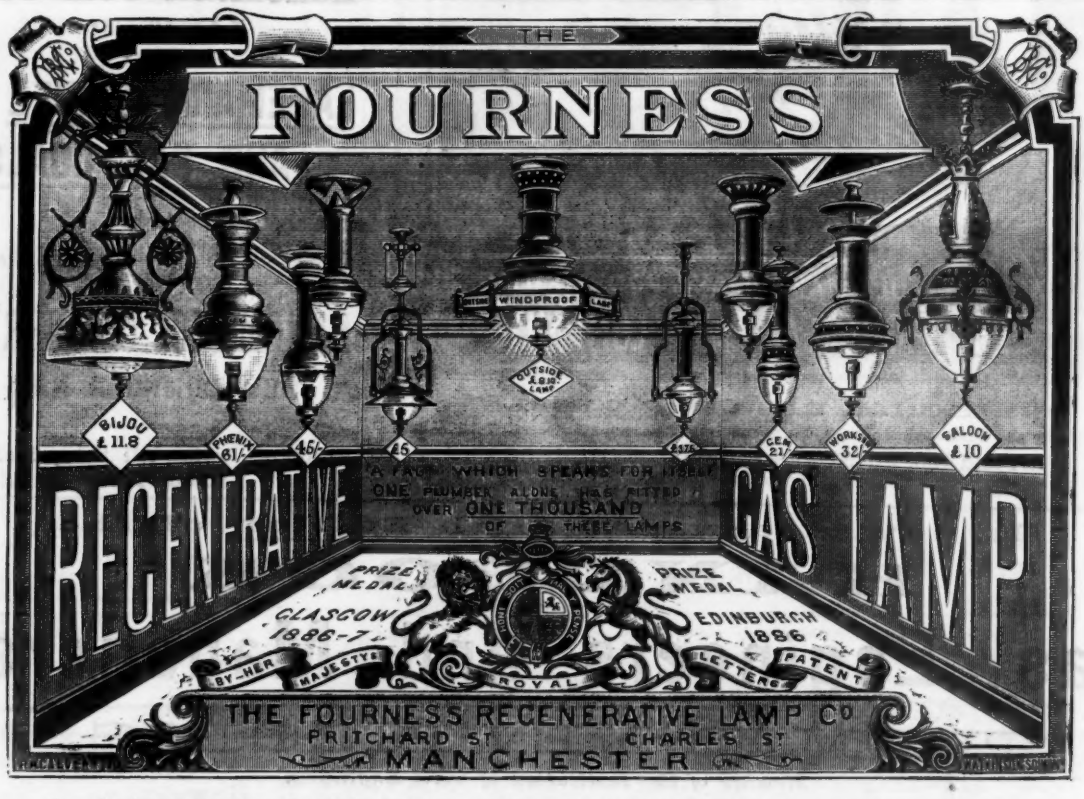

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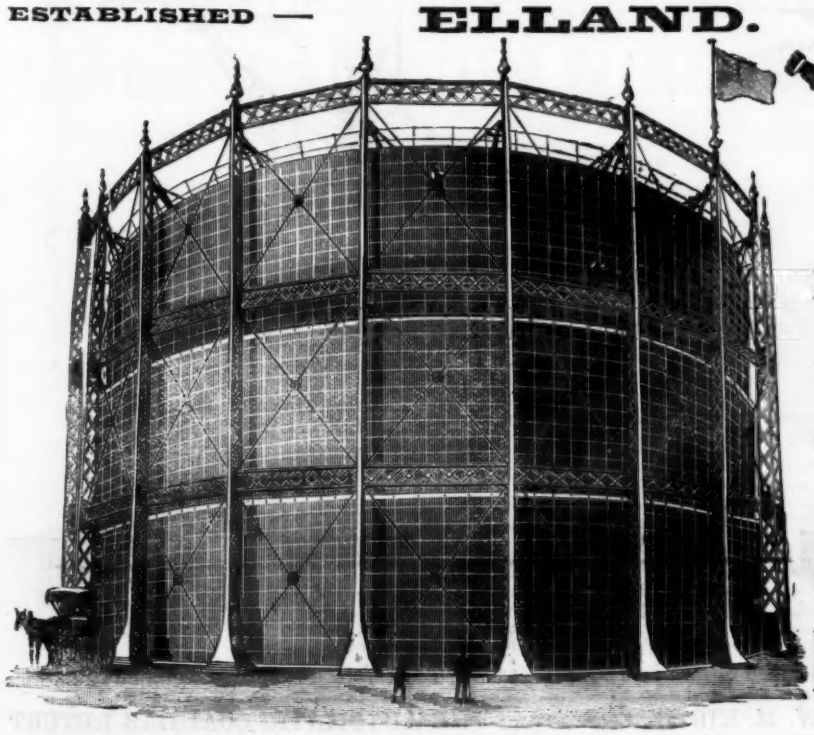

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AUTOMATIC SYSTEM OF CHARGING & DRAWING INCLINED GAS-RETORTS.

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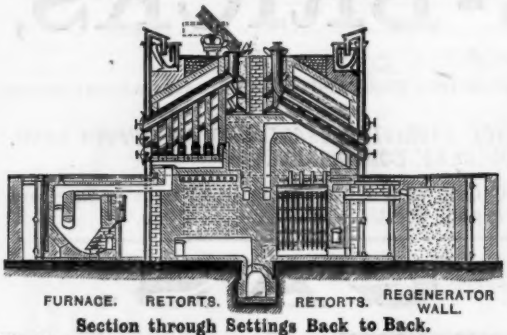
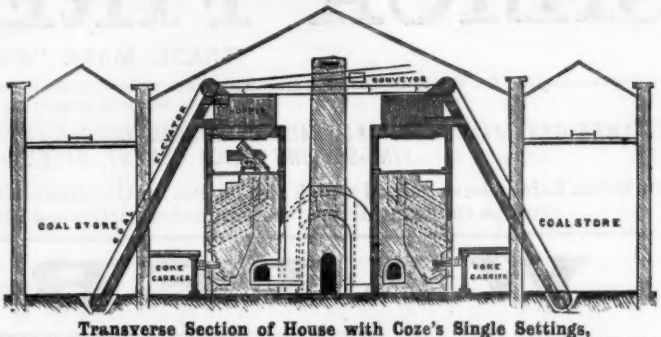
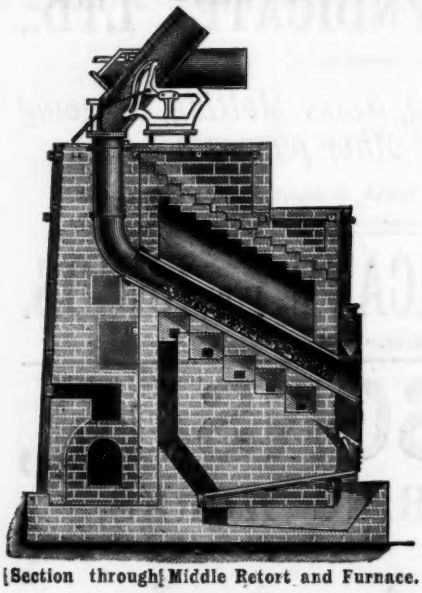
This System of Automatically Charging and Discharging Retorts without machinery or arduous labour is in operation at several places on the Continent and in America, and will shortly be at work in various Gas-Works in England.



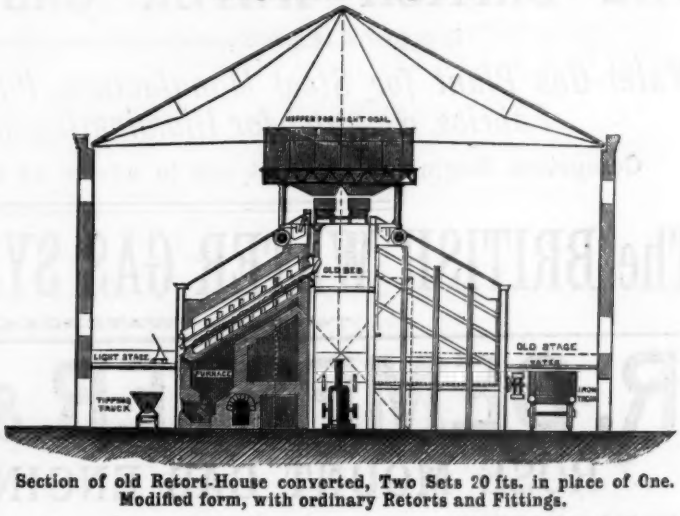
Section through Settings Back to Back.
Working off ground floor with Generator under Stage and Regenerator under the Sets.



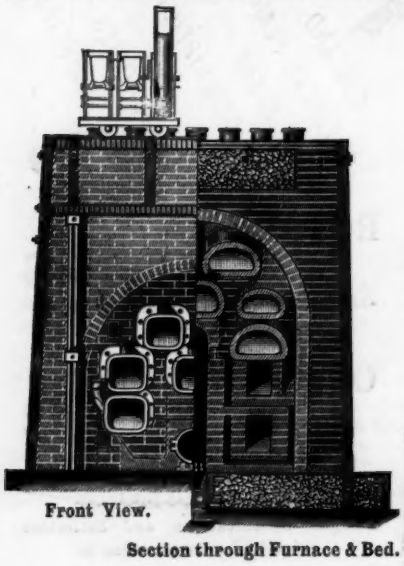
Transverse Section of House with Coze's Single Settings,
Showing Method of working Two Single Settings and Distributing the Coal to the Supply Hoppers; the whole of the work being Automatic.
This plan is for a large House.



[Section through] Middle Retort and Furnace.

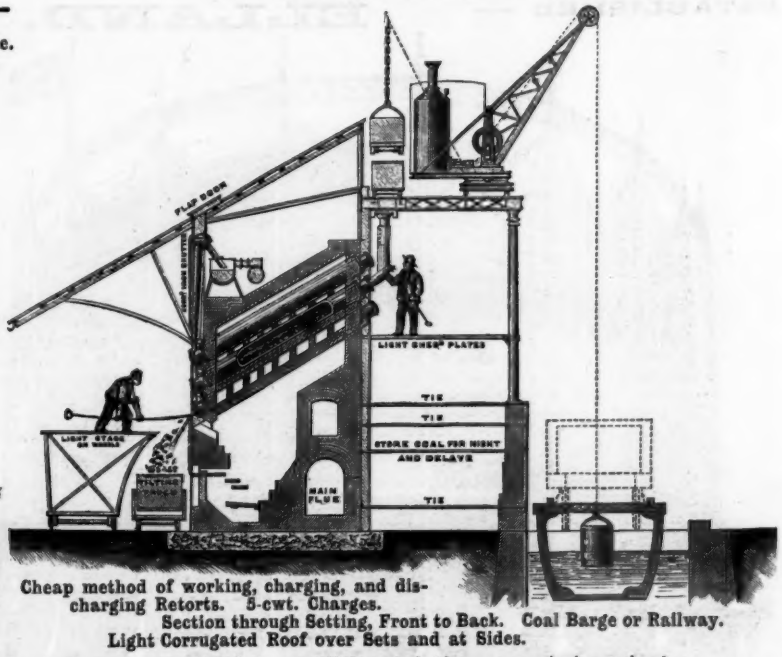


Section of old Retort-House converted, Two Sets 20 fts. in place of One.
Modified form, with ordinary Retorts and Fittings.



Front View.

Section through Furnace & Bed.



Cheap method of working, charging, and discharging Retorts. 5-cwt. Charges.
Section through Setting, Front to Back. Coal Barge or Railway.
Light Corrugated Roof over Sets and at Sides.

These Systems are fully Patented, and any Infringer will be strictly proceeded against.

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	72·5 ...	124·3 ...	76·7 ...	93·7 ...	92·2

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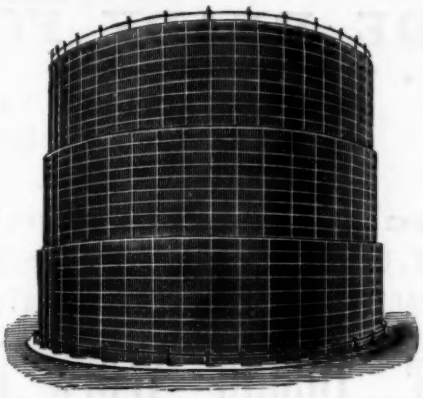

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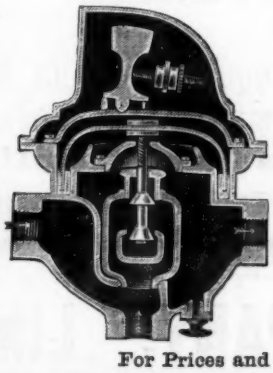

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CLEANLY, PORTABLE, ECONOMICAL,

And applicable for all kinds of Rooms where a Comfortable and Wholesome Atmosphere is desired.

For Prices and further Particulars, apply to the Manufacturers,

THE WENHAM COMPANY, LTD.,
UPPER OGLE STREET, FITZROY SQUARE, LONDON, W.
MANCHESTER: 5, Deansgate. BIRMINGHAM: 121, Corporation Street.

BELL'S ASBESTOS AQUOL PAINT

BELL'S ASBESTOS

IS MADE READY FOR USE.

IS FIRE RESISTING.
IS WASHABLE.
IS NON-POISONOUS.
IS MANUFACTURED IN ALL USEFUL COLOURS.
IS IMPERVIOUS TO HEAT, COLD, OR WATER.
IS WITHOUT SMELL.

No expensive Oil or Turpentine required.

WILL NEVER BLISTER.

HAS A COVERING CAPACITY **40** PER CENT. GREATER THAN LEAD PAINTS.

For Outside or Inside Work in any Climate.

Bell's Asbestos Aquol Paint is equally suitable for the finest decorative work as well as for general painting. It can be applied over or under any other paint, and, owing to its easy application, can be used with a large distemper brush; the SAVING THUS EFFECTED IN LABOUR BEING **50** PER CENT. OVER THAT OF LEAD PAINTS.

Bell's Asbestos Aquol Paint is susceptible of the most delicate treatment; and, owing to its perfect flatted surface, it brings up the varnish in a manner that no other paint can equal. ONE COAT OF VARNISH ON **Bell's Asbestos Aquol** IS EQUAL TO TWO COATS ON ORDINARY PAINT.

BELL'S ASBESTOS AQUOL PAINT is specially adapted for Private Houses, Exhibition Buildings, Ships, Churches, Asylums, School Boards, Railway Stations, and all work of Wood, Iron, Cement, Plaster, Stone, Brick, &c., &c.

Those who Study Economy and Protection from Fire should use only

BELL'S ASBESTOS AQUOL PAINT.

BELL'S ASBESTOS AQUOL PRIMING is made Ready for Use.
BELL'S ASBESTOS AQUOL PRIMING stops all suction of Wood, Cement, Plaster, &c.
BELL'S ASBESTOS AQUOL PRIMING should be applied to all New Work.

Suitable for Ceilings, Walls, and New Wood, and is very durable.

BELL'S ASBESTOS AQUOL KNOTTING, for Stopping Knots in New Work.

AN EXCELLENT CURE FOR DAMP WALLS.

Colour Cards and Price Lists on Application.

Supplied in Casks of 5 to 7 cwt., and Iron Drums of 28, 56, and 112 lbs., Sample Tins of 7 and 14 lbs.

Owing to its Covering Capacity, a SAVING IN FREIGHT of 40 per cent. is effected for a given surface.

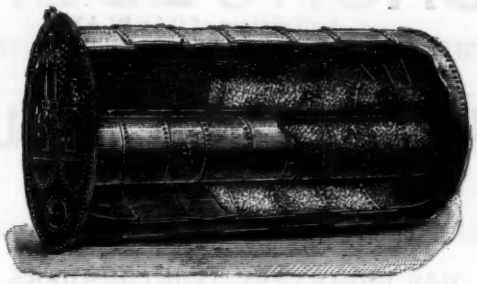
BELL'S ASBESTOS COMPANY, LIMITED,

SOUTHWARK, LONDON, S.E.

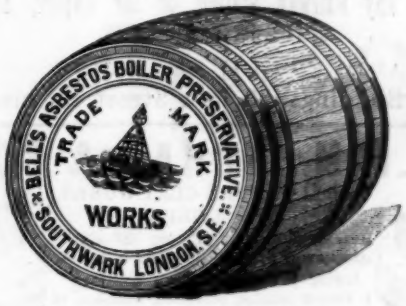
DEPOTS—MANCHESTER: Cable Street, Blackfriars. LIVERPOOL: 2, Strand Street, James Street. HULL: Humber Dock Basin. GLASGOW: 35, Robertson Street. DUBLIN: 2, St. Andrew Street. AMSTERDAM: 264, N. Z. Voorburgwal. BERLIN, BARCELONA, and ANTWERP.
AGENTS—BIRMINGHAM: BELL and Co., 7, John Bright Street. CARDIFF: BELL and Co., West Bute Street.

BELL'S ASBESTOS BOILER PRESERVATIVE

Will remove Incrustation from Steam-Boilers of all kinds without chipping.



A shows Boiler Plates when incrusted.
B shows Boiler Plates when cleaned by this Composition.



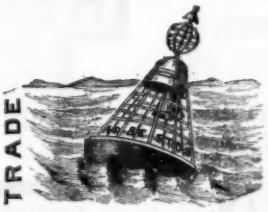
Every Cask is sent out as above.

The action of this **BOILER PRESERVATIVE,** by absorbing the free oxygen that is in the water, **entirely checks pitting and corrosion.** It also disintegrates incrustation so immediately as to prevent its adhering to the plates; and the deposit falls to the bottom in a loose powder, which is easily swept out. By keeping boilers clean, a **great economy of fuel is effected,** and the danger of the plates burning is entirely obviated; thus avoiding the great risks which are inseparable from scaled plates, lengthening the life of a boiler, and **covering its own cost a hundredfold.** Whenever possible it should be used through Feed Pump or Injector, which it will also keep clear from incrustation. The small quantity required to effect its purpose makes this the most economical, and more than repays the higher price we charge for a fluid which, in the case of many other makers, is useless.

QUANTITY REQUIRED A quarter of a pint weekly per horse power indicated; where the water is very bad rather more, or one pint for every 700 gallons of water evaporated.

BELL'S ASBESTOS CO., Ld.

DEPÔTS.
MANCHESTER: Cable St., Blackfriars.
LIVERPOOL: 2, Strand St., James St.
HULL: Humber Dock Basin.
GLASGOW: 35, Robertson Street.
DUBLIN, BERLIN.



DEPÔTS.
AMSTERDAM: 264 N. Z. Voorburgwal, BARCELONA, and ANTWERP.

AGENTS.
BIRMINGHAM: BELL and Co., 7, John Bright Street.
CARDIFF: BELL and Co., West Bute St.

SOUTHWARK, BELL'S ASBESTOS. LONDON, S.E.

BELLS ASBESTOS
YARN AND SOAPSTONE PACKING
Is the BEST LOCOMOTIVE PACKING made.

BELL'S
COMPOUND HYDRAULIC PACKING
Is specially suited for Hydraulic Machinery, Accumulators and Ammonia and all Pumps.

BELL'S ASBESTOS LUBRICANT
Is unequalled
For Steam-Engines & Cylinders, Gas-Engines, and every class of machinery.

BELL'S ASBESTOLINE
The reputation of this Lubricant is based on the experience of thousands of users, which places it far in advance of those who rely only on mere laboratory tests.

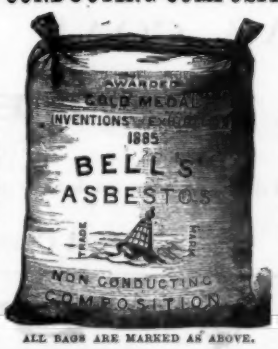
ASBESTOLINE IS THE CHEAPEST MOST EFFICIENT, CLEANEST MOST INODORCUS AND SAFEST LUBRICANT.

ASBESTOLINE HAS SAVED 90 PER CENT. OVER OIL. Has been used for all purposes, AND BEATEN ALL OTHER LUBRICANTS IN ACTUAL WORK.

BELL'S ASBESTOS
EXPANSION SHEETING
RINGS, AND TAPE.
Is the most efficient and reliable Material for Manhole, Mudhole, Steam-Pipe, and all other Joints.

BELL'S ASBESTOS
NON-CONDUCTING COMPOSITION.

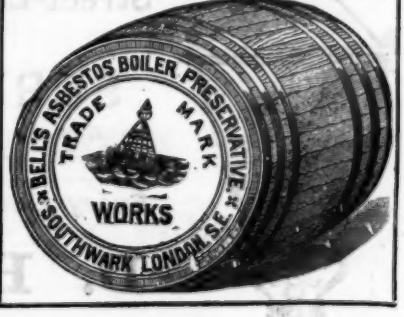
Will reduce loss by radiation and saves 40 per cent. of fuel.
Is superior to any other, and saves its cost in a few months.



Can be applied again after many years' service. Is sent out dry in bags; therefore cheaper than others sent out wet.

ALL BAGS ARE MARKED AS ABOVE.

BELL'S ASBESTOS
BOILER PRESERVATIVE
Will effectually keep Boilers clean, and remove any Incrustation, without injury to the Boiler, Plates, or Fittings.



WILSON CARTER & PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station, or for Export, all kinds of Fuel for Gas purposes.

ADDRESS CHIEF OFFICES:

Temple Buildings, 50, New Street, Birmingham.

WILLIAM INGHAM & SONS,

WORTLEY FIRE-CLAY WORKS, Near LEEDS

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing Adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

MACHINE-MADE GAS-RETORTS.

F. & C. OSLER,

(ESTABLISHED 1807)

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS.

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES,

TABLE GLASS OF ALL KINDS,

CHANDELIERS IN BRONZE AND ORMOLU.

MODERATOR LAMPS.

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HENRY BALFOUR & CO.,

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MAKERS OF

GASHOLDERS

And all classes of GAS PLANT,

REVOLVING BRUSH SCRUBBERS, FOUR-WAY VALVES.

LONDON: 13, BILLITER STREET, E.C.

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AND ALL KINDS OF GAS AND WATER WORKS PLANT.

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CLAYTON, SON, & CO.

LIMITED,

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MAKE

RETORT LIDS

OF ALL FORMS AND SHAPES IN IRON OR STEEL

BY SPECIAL HYDRAULIC MACHINERY.

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PRICES ON APPLICATION.

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A SPECIAL COMPOUND

FOR THE CURE OF STOPPED ASCENSION-PIPES,

A couple of charges of which will clear a stopped pipe, and an occasional charge keeps them clean, and also increases the make per ton and the illuminating power.

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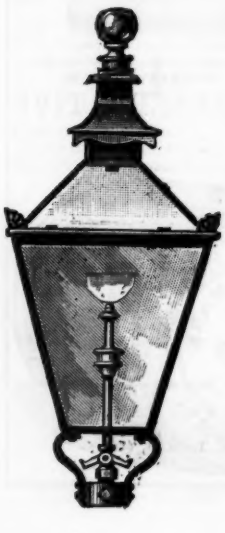

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ORDINARY OR

OUR SPECIAL HIGH-POWER.

The best Lamps in the Trade.

Street-Lamp Governors. Gas-Meters.

HULETT'S

SERVICE CLEANSER.

No Gas Company should be without this Apparatus.

THOUSANDS IN USE.

Every Description of Gas-Fittings, Pressure-Gauges, &c.

D. HULETT & CO., LIMITED,

55 & 56, HIGH HOLBORN, LONDON.

Gas-Bags for Mains. High-Water Boots. Woollen Miners' Jackets.

Delivery and Suction Hose, Gutta-Percha Acid Bottles, Leather Driving Bands, Woven Canvas Hose for Fire-Engines, Wedge and Square Gas-Bags, Air and Water Beds for Invalids, Oil Tarpaulin Coats, Trousers, Hats, &c., Squeegees for cleansing Pavements, &c., Billiard and Bagatelle Cush, Tricycle Tyres, Leather Hose, Cotton Waste, Engine Cloths, Oils, &c., India-rubber Waterproof Garments for Walking, Driving, or Sporting Wear, Diving and Wading Dresses, Printers' Blankets, Iron Wheels and Rollers covered with India-rubber, and Stokers' Gloves.

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WILLIAM GRICE & CO.

Ironfounders, Gas and General Engineers,

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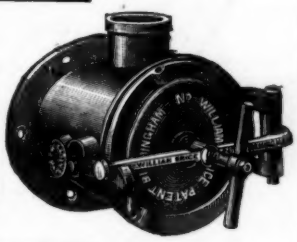
MANUFACTURERS OF

Grice's Patent Self-Sealing Mouthpieces.

To suit all sized sections of Retort. Over 70 stock sizes. Largely used in England.

Grice's Patented Stoking Machinery.

Made to suit large or small Gas-Works. The one machine draws the spent coke and recharges the Retort at one operation. Self-contained; working from engine on base or by hand. Price and particulars on application.



PURIFIERS, TANKS, PIPES, & OTHER PLANT MADE.

Machine-Moulded Spur, Bevel, Mitre, and Helical Wheels and Pulleys, to 20 feet diameter.

WROUGHT-IRON WAREHOUSE CRANES

As supplied to the English Railway Companies.

MORTAR & LOAM MILLS.

With or without Engines.

PUNCHING AND SHEARING MACHINERY

Of all Kinds.

ENGINES. Vertical and Horizontal; High and Low Pressure CONDENSING BOILERS; Tubular and Ordinary CASTINGS. All descriptions up to 15 tons.

"THE METEOR."

NEW HIGH-POWER GAS-LAMP.

Westphal's Patent.

Gas Companies should hire these Lamps to their Consumers, and introduce them for Street Lighting as a rival to the Electric Light, as they do not get out of order, are most economical, and the Burner being a circular slit does not choke up.

Particulars and Prices Free.

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153 TO 155, CANNON STREET, LONDON BRIDGE, E.C.

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Cast and Wrought Iron Tanks, Purifiers, Condensers, Scrubbers, Retort-Lids, Cross-Bars and Screws, Wrought-Iron Boilers for Stationary, Portable, and Marine Engines, Sugar Pans, Coolers, Clarifiers, Punts, Boats, Bridges, Girders, Roofs, Cisterns, Oil-Tanks, Melting-Pots, Crucibles, Salt-Pans, Arch and Range Boilers, and every description of General Ironwork.

Drawings, Specifications, and Estimates supplied.

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REAL OLD SILKSTONE GAS COAL.

Address, THE STRAFFORD COLLIERIES COMPANY,

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MANLOVE, ALLIOTT, & Co., Ltd.,

ENGINEERS,

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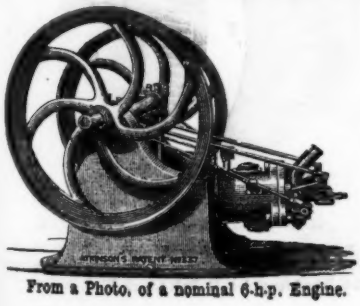
LONDON, MANCHESTER, AND GLASGOW.



From a Photo. of a nominal 6-h.p. Engine.

ATKINSON'S "CYCLE" PATENT

GAS-ENGINE.

The simplest and most economical Gas-Engine made.

THE BEST ENGINE FOR ELECTRIC LIGHT.

Consumes less Gas per brake horse power than any other Gas-Engine.

TELEGRAPHIC ADDRESS: "MANLOVES NOTTINGHAM."

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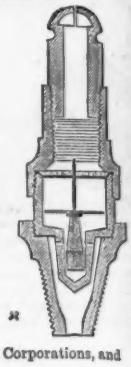
PENN STREET, CURZON STREET, BIRMINGHAM,

Have, from the 1st of January, 1890, commenced the supply of their

IMPROVED PATENT GAS GOVERNOR BURNER,

which cannot be surpassed by any other Burner in the market at the present time.

DO NOT MELT.



Please mention when required for Cannel Gas.

PRICE **14s.** PER DOZEN. *Trade Terms and further particulars on application.*

They will be pleased to supply a sample of their IMPROVED PATENT STREET LAMP GOVERNOR, *free of charge*, to Gas Companies, Corporations, and Municipal Authorities on application.

SIXTY PER CENT. ECONOMY IN GAS LIGHTING.

The Schülke Regenerative Lamp

FOR

DOMESTIC AND EXTERNAL LIGHTING.

The only Regenerative Lamp employing the Common Flat-Flame Burners.

Lamps giving 20-Candle power consume less than four feet of Gas per hour.

PURE WHITE & PERFECTLY STEADY LIGHT,

NOT AFFECTED BY DRAUGHTS.

Suitable for any existing fittings (Brackets or Suspending).

Can be fixed in a few minutes.

May be seen at the Offices of the

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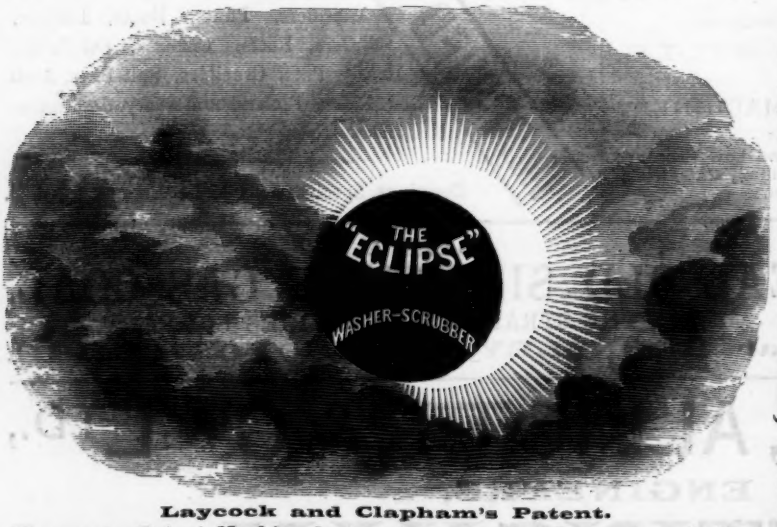
LONDON, E.C.,

Where Price Lists and full particulars may be obtained.



Laycock and Clapham's Patent.

The most efficient Machine known for extracting Ammonia and other Impurities from Coal Gas.

MACHINES with a total capacity of **42,500,000** cubic feet now working, and give great satisfaction.

LAST YEAR 11 Machines erected with a total capacity of **20,000,000** *feet.*

Send for Descriptive Catalogue to the Sole Makers:

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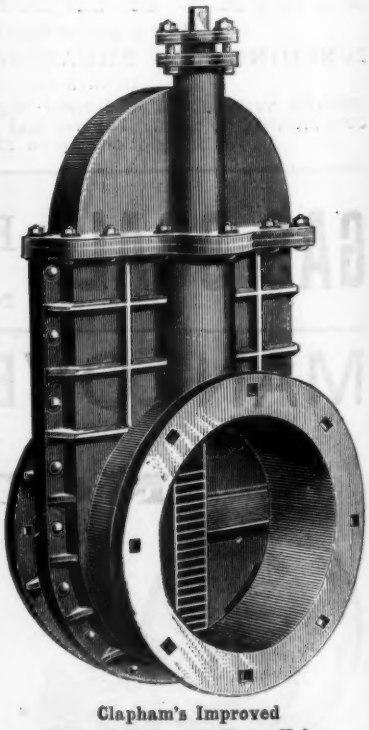
SILVER MEDAL, Inventions Exhibition, 1885.



Clapham's Improved Internal Rack and Worm Valve, Gas-Mains, &c.

London: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London,—Tuesday, Aug. 5, 1890.